



# *I LIKE DIVING*

by TOM EADIE



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## I LIKE DIVING

*By Thomas Eadie*

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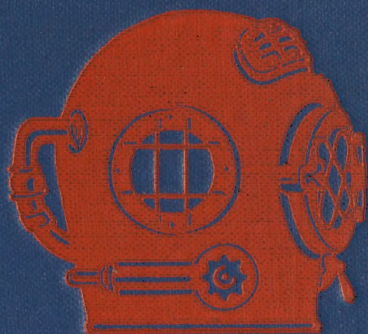
TOM EADIE got the Congressional Medal of Honor for his work on the S-4. He had already received the Navy Cross, having done a hundred other difficult and dangerous deep-sea jobs. His experience as a diver covers a period of twenty years.

'I Like Diving' is much more than a narrative of under-sea adventures, thrilling though they are. It is a picture of the science of modern diving at its best, culminating, as it should, in the extraordinary achievements of the picked men — Eadie and his fellows — who worked on the S-51 and S-4 jobs, in bitter cold, in darkness, in dangerous tides and currents, persisting, daring, accomplishing. It is a wonderful record, inspiring to youth, thrilling to older readers.

*Lavishly illustrated*

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**I LIKE DIVING**









Sincerely  
Tom Cadie



# I LIKE DIVING

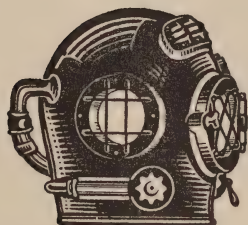
*A Professional's Story*

BY

TOM EADIE

WITH AN INTRODUCTION BY

REAR-ADMIRAL PHILIP ANDREWS, U.S.N.



BOSTON AND NEW YORK

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*To my wife  
who worries about me*





## CONTENTS

INTRODUCTION	xiii
I. THERE IS ALWAYS A THRILL IN IT	1
II. WHAT A DIVE IS LIKE	23
III. WITH THE OLD PIG-BOATS	38
IV. A CIVILIAN DIVING INSTRUCTOR	47
V. BENDS, SHARKS, AND LOBSTERS	60
VI. THE FINANCIAL SIDE	74
VII. SALVAGING A SUBMARINE	92
VIII. THE S-51 COMES UP	114
IX. BACK IN THE NAVY	131
X. THE STORY OF MICHELS	140
XI. A WINTER SALVAGE JOB	168
XII. THE S-4'S DEAD	191
XIII. THE MEDAL OF HONOR	209
APPENDIX	
I. The Official Correspondence Following the Work on the S-51, and the Award of the Navy Cross	225
II. The Official Correspondence Following the Work on the S-4, and the Award of the Con- gressional Medal of Honor	235
III. Resolutions Passed by the City Government of Newport, Rhode Island	241



## ILLUSTRATIONS

TOM EADIE IN UNIFORM	<i>Frontispiece</i>
FRONT AND REAR VIEWS OF DIVER PARTLY DRESSED	12
A PART OF THE DIVER'S OUTFIT	16
ADJUSTING DIVER KELLY'S SHOE BEFORE HE IS LOW- ERED TO THE SUNKEN S-51	26
International Newsreel Photograph	
DIVER GOING DOWN TO WASH A TUNNEL UNDER THE SUNKEN SUBMARINE	32
A GROUP OF THE DIVERS ON THE S-4 JOB, INCLUDING CARR AND EADIE	48
DIVERS WHO WORKED ON THE S-4, WITH JAKE AN- DERSON, WHO TAUGHT EADIE TO DIVE: MATTOX, EADIE, ANDERSON, BURD, CARR, AND MICHELS	48
THE DIVERS WHO RAISED THE S-51	92
U.S.S. FALCON, THE SHIP THAT SALVAGED THE S-51 AND THE S-4	96
TOM EADIE IN HIS DIVING-SUIT	100
International Newsreel Photograph	
TALKING WITH A DIVER AT THE BOTTOM	100
International Newsreel Photograph	
TALKING BY TELEPHONE WITH THE DIVERS AT WORK ON THE S-51	104
International Newsreel Photograph	
COMING UP FROM A DIVE	104
International Newsreel Photograph	



THE SUNKEN S-51 BEING TOWED TO NEW YORK	108
International Newsreel Photograph	
THE SECOND PONTOON LYING OFF THE FALCON JUST BEFORE IT WAS LOWERED TO THE SIDE OF THE SUNKEN S-4	114
International Newsreel Photograph	
THE BOW OF THE S-51 COMES UP PREMATURELY	118
International Newsreel Photograph	
THE S-51 APPROACHING HELL GATE BRIDGE	124
International Newsreel Photograph	
LIEUTENANT-COMMANDER ELLSBERG WITH DIVERS WICKWIRE AND EADIE ABOARD THE FALCON	128
International Newsreel Photograph	
LIEUTENANT-COMMANDER ELLSBERG, CAPTAIN KING (IN CHARGE OF THE SALVAGING), AND CAPTAIN HARTLEY OF THE FALCON	128
International Newsreel Photograph	
THE COAST GUARD DESTROYER PAULDING, WHICH SANK THE S-4	140
International Newsreel Photograph	
THE PAULDING AFTER THE COLLISION	140
THE S-4 IN DRYDOCK AT THE BOSTON NAVY YARD	144
International Newsreel Photograph	
THE S-4 IN DRYDOCK, SHOWING THE WOUND	144
International Newsreel Photograph	
ADMIRAL BRUMBY ANNOUNCES BY HIS HANDS THAT SIX ARE ALIVE	156
CARR AND EADIE READY TO GO DOWN	156
International Newsreel Photograph	

## ILLUSTRATIONS

xi

TOM EADIE, WILLIAM CARR, FRED MICHELSON, AND CAPTAIN HARTLEY OF THE FALCON	68
CAPTAIN HARTLEY OF THE FALCON AND TOM EADIE WITH THE SHIP'S BELL OF THE S-4 International Newsreel Photograph	190
TOM EADIE WITH THE HAMMER USED BY THE TRAPPED MEN OF THE S-4 FOR SIGNALLING International Newsreel Photograph	190
VALVE HANDLE OF BATTERY VENTILATOR OF THE S-4	190
EADIE AND LIEUTENANT-COMMANDER BAYLISS OF THE PAULDING EXAMINING PHOTOGRAPHS AT THE S-4 INQUIRY	202
COMMANDER SAUNDERS TURNING ON THE AIR TO FORCE THE S-4 TO THE SURFACE International Newsreel Photograph	214
CONNING TOWER OF THE S-4 EMERGING FROM THE WATER International Newsreel Photograph	214
EADIE DECORATED WITH CONGRESSIONAL MEDAL OF HONOR BY THE PRESIDENT Henry Miller News Picture Service Photograph	218
THE S-4'S CONNING TOWER AT THE BOSTON NAVY YARD International Newsreel Photograph	222





## INTRODUCTION

THIS simple recital, simply told by an unspoiled man, will win interest from old and young. Eadie's life was notable principally for his diving exploits and the persistent courage and ingenuity which he showed in overcoming great difficulties and dangers. I was Commandant at Boston during the S-4 salvage work. We furnished material of all kinds on short notice, sent frequent weather reports for guidance, and were at all times in close touch with the work at Provincetown. To me it seemed impossible that divers could work in mid-winter with the temperature of the water at 34 degrees, and even more bitter cold on the surface. My one visit to Provincetown increased this feeling. They were constantly diving in a strong wind and a fairly heavy sea. Only those who know and have actually seen can realize the mighty force of the sea. When the salvage force began operations by attempting a rescue, there were no permanent heavy moorings, and no time to place them had they been available. As a result, at 102 feet depth, which is very deep to anchor a ship and requires long scope of chain, the vessels dragged and swung around and made diving both difficult and dangerous. Permanent moorings were placed as soon as possible, with buoys on the surface, so that the salvage vessels could leave and return to them easily. And these heavy moorings did not drag and were numerous enough so that the

vessels could be held in place and prevented from yawing.

Eadie's story of dangers and difficulties overcome carries a lesson to all readers, and probably this is what it has meant to him: Do your best and give your best to the task in hand. I believe I can say that this is the spirit of the Navy. Certainly in time of stress and danger they go far beyond that, and commonplace men become heroic.

PHILIP ANDREWS  
*Rear Admiral, U.S. Navy*

NAVY YARD, BOSTON, MASS.  
*March 6, 1929*

**I LIKE DIVING**





# I LIKE DIVING

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## CHAPTER I

### THERE IS ALWAYS A THRILL IN IT

I LIKE diving. There is always a thrill in it. I felt it before I ever made a dive, and I feel it now when I have been diving for nearly twenty years. You have to like it, or you don't stay at it, for it is no boy's play. There's a heap to diving besides putting your head under water. It means the hardest kind of work — real manual labor — under the most difficult conditions, and sometimes under conditions of great distress.

Take a job when the ocean water is down to the freezing point of fresh water and when you can't do the work in gloves. To get an idea of it, just sit in a boat in your warm overcoat and stick your hand over the side into the salt water. Hold it there for five minutes in that freezing brine, and then try to think what it would feel like if you kept it there an hour.

It isn't easy to explain the thrill you get out of diving. It isn't exactly the love of adventure, though every dip is an adventure, or may be one before a man comes to the surface again.

Certainly it isn't the thrill of facing danger, though a diver's life is really in the hands of the man on the top-side tending him, and any one of a lot of little things

may in an instant reduce a diver's chance of seeing his family again to a one-to-ten shot.

Certainly it isn't the thrill of just a new experience. One dive would satisfy that craving. There is something more that makes some men keep at it and become divers. I suppose I just happened to be one of those men that have that something more, though sometimes it seems to me as if I couldn't have been anything but a diver.

Whatever the thing is, it makes diving a profession instead of a trade — for I take it that a profession is an occupation where the work is more interesting than the pay. Not that the pay isn't good — for some divers at least. With nothing but my pay I have managed to acquire a good home of my own; I have a car, and I live along with the other millionaires and navy men in Newport.

Lately, because of the publicity following the work on the S-4 and my luck in being able to rescue Fred Michels when he was trapped on her deck, I have been asked to lecture on diving in many places. At these lectures there are always a great many young boys, and when I have finished talking to the audience, these boys always wait and want to know the million details of diving.

I like to talk to them, and I like to see boys who have an interest in doing something. I get tired of people who don't think about anything but getting something. That is really why I have written down my story — the hope that in this way I can talk to many more persons — especially boys — than I can manage to meet face to face.

Much of what I have to tell is in a way old stuff, for my experiences go back through twenty years. In that time many new devices and methods have been adopted, and right now the Navy Department is carrying on more experiments in underwater work than ever it did before.

I have seen the electric torch, for cutting metal under water, beat out the acetylene torch; the batteryless telephones supplant the old telephones that were put out of business if they got wet; and I have seen the whole business of raising sunken vessels with pontoons worked out and improved.

Right now, they are experimenting with rescue devices for men trapped in submarines, and are laying out big plans for taking care of the submarine's problems.

Under this new arrangement the Navy will soon have many more deep-sea divers than ever before. A deep-sea diving school has been set up at Washington, and is in charge of Lieutenant Henry Hartley, who commanded the Falcon on the S-51 and S-4 jobs.

After getting their instructions, these new divers will have to do so many hours of diving in so long a time; then they will be stationed, with rescue ships like the Falcon, at all stations along the coast. After that, if we have any more submarine disasters, they can get quickly to the scene, can find the submarine, get her position and depth, and find out whether there is still life aboard, before a salvage vessel could get there.

By the time all this is in action, I shall probably be done with diving — for old men can't dive. But I have had a full life, and an interesting life, and I know that



many of the things I have been able to do were worth the doing.

There was nothing in my early life that headed me toward diving as a profession, nor in my family history either. My father was Scotch, and I was born at Partick, near Glasgow, in 1887. My father was a stonemason, but, though most houses and big buildings in Scotland are of stone, there is always trouble in the stonemason's trade. If he had six months of work in a year, it was a good year.

My mother died soon after I was born. I do not remember her at all, any more than my Aunt Annie, with whom my father left us three boys when he went to America, discouraged over the conditions in Scotland. He worked for about two years in America, and then returned to Scotland and brought John, Hugh, and myself back to New York with him.

My father kept up a correspondence with a girlhood friend of my mother's in Scotland, and she finally came to America and became his wife. After she had set up a home, my father brought us three boys there, and she was the only mother I ever knew. She could not have been more tender and loving if she had really been my mother. My father died in 1918. My stepmother is still living.

We lived at first in New York City, in Seventy-Second Street, and I got the first of my schooling there, though I hardly remember New York life at all, except that it was city life, and that we lived in a block.

Our first move was to Long Island City, which was then a place of forty-five thousand people, but like New-

port a city of detached homes. We were still having a hard time to get along. My father had eight children in his second marriage, and we boys had to get out and help as early as we were able to do so.

I worked where I could — as an errand boy first, of course, in grocery shops and butcher shops, and later in the mills. I can remember that during the Spanish-American War my father would go downtown and come home with as many newspapers as he could possibly carry, and that we three boys would go out and peddle them.

Stonecutting was still a trade where there was always trouble. My father thought maybe he would do better in New Jersey, and we moved to Kearney, near Newark, and later still to Harrison, which is near by. I worked in the Hartshorn Shade Roller Factory, and in the Worthington Hydraulic Pump Works. Of course I didn't know it, but working with materials and learning how machine processes are done was all education that was later valuable to me in my work.

Then I went into the service in the Navy. I wasn't getting anywhere, and one day when a few of us boys got together and got to talking, the lot of us decided that we weren't getting anywhere. Then somebody suggested, 'Let's go into the Navy.' We really didn't know what we wanted.

About five of us went to the army recruiting station, but when it came to the point, the others got cold feet, and we all came out again. Then we went to another recruiting office, and there were several more cases of cold feet.

About this time I was disgusted and said, 'Oh, let's get somewhere.' So I led the way, and we went to the naval recruiting office in the post-office at Newark. When we were lined up, the others quit as they had before. I stuck, and on July 6, 1905, enlisted in the United States Navy.

I was sent to Newport for the regular course of training in seamanship, about four months. I had never been round the water, nor had boats, and I got a good deal of a kick out of the training.

I'll never forget my first experience at Newport. I came from a family that had its own live stock — I mean, we raised chickens. Well, at that first breakfast in Newport, we had eggs. The guy next to me opened his — and I opened the window.

I couldn't understand how anybody could eat eggs like that, and it was a long time before I could stand even the smell of eggs.

I passed in my seamanship courses with pretty fair honors, for I put my heart into anything I tackle, no matter how small it is, and I always give to anything I am doing all there is in me. Then again I have always had a good deal of confidence in myself. If I ever see anybody on a job he can't do, I'm just itching to do it myself.

My daughter is eleven years old, but she is still firmly convinced that her father can do anything. No matter what kind of job turned up to be done around the house, I would always say, 'Well, I'll fix that up.'

It might be an electrical job, or carpentry, or plumbing — she would say, 'Why, my daddy is a plumber' —

or was whatever the job called for. For, of course, a diver has to do every man's job under water; you can't have diving plumbers, and electrical divers, and diving carpenters.

A short time ago I wrote an article on diving for a newspaper. When the check came in, my daughter thought the situation over for a while. Then she said, 'Gee, Dad, you can do anything! But why don't you write? It is much easier than diving, and it pays better.'

There isn't any more to the story, except that I suppose the time must be getting nearer when the daughter will find she was wrong on both counts; I can't do everything, and writing isn't easier than diving.

When I finished my training, I was sent to the Alabama as a seaman, second class. We joined the fleet, and I served my time out in her. I was assigned as a helper to the blacksmith and ship-fitter. Here again, though I didn't know it, I was getting training that was to come in very useful later on. I learned about handling heavy material, where every operation was an emergency operation; I learned how tackle was used and how, for instance, you would go to work to set something into a smooth surface on which you had to get a purchase for a lift.

The Alabama spent her time between Newport, New York, and Guantanamo. Then, when the 'Big Sixteen' were sent round the world by Roosevelt, she went with the fleet, and I was in her.

The first part of my enlistment was — well, I had a record of which I had no right to be proud, though in the beginning it was no fault of my own.



The first incident happened when we were lying in Brooklyn Navy Yard at the dock. I was doing some work up in the yard, and I was just coming back aboard one day, carrying a heavy sledge on one shoulder and a piece of heavy metal in the other hand.

It was high tide, and the gangplank went up at a steep slope. I was toiling up, head down, and swaying under the load I was carrying. Just ahead of me an officer was going up the gangway, and for some reason he stopped. I didn't expect him to stop and took another step, and hit him with the handle of the sledge.

He bawled me out, and I said I hadn't any idea he was going to stop. But he had to report the incident, and I was put into the brig until the next 'mast,'<sup>1</sup> when I was brought up before the captain.

The officer told what had happened, and then I stated my case. The captain said, 'I'm sorry, but I've got to punish you.' No matter how accidental it was, I had struck an officer. And I thought to myself, 'So that's the way this thing works, eh?'

Well, I got so many days on bread and water, and then restricted liberty for so long a time afterwards. Probably because I was young and headstrong, when the first liberty came, I overstayed my restriction. I came back to the ship when I got good and ready.

That meant more punishment, of course, and more restricted liberty. And the very next time we got liberty,

<sup>1</sup> 'Brig' is the seagoing word for a ship's prison; 'mast' means the informal court with the captain presiding as judge; it is so called because in the old days it was literally held at the mainmast; to-day it may be in a compartment below the waterline.

I overstayed again. When I was brought to the mast this time the captain said, 'You're looking for a kick-out, aren't you?'

I wasn't. Such a thing was farthest from my mind. So I just grinned at him, and said nothing.

'Well,' says the captain, 'you aren't going to get it.'

Just about that time I sat down and talked to myself. And I said, 'What's the use of acting like this? You aren't going to hurt anybody but yourself.' And I made up my mind to settle down.

'This has been nothing but a bad dream,' I said to myself. 'It really never did happen at all.'

Besides, we were going to a lot of new places, and I would want to see them, and a man with restricted liberty would be out of luck.

At San Francisco — we had gone by way of the Straits of Magellan — the *Maine* and the *Alabama* were replaced by other ships in the fleet, and we became the advance guard for the rest of the way — and incidentally, we missed seeing some of the places where the main fleet put in. But we also missed having to do the heavy parades; we missed the bother of the crowds, and we missed having to coal ship ourselves.

From 'Frisco we went to Honolulu, Guam, where there were at that time only two white women on the whole island, Manila, Singapore, Aden, and Ismaila, where we got trips to the Pyramids and the Sphinx, and then to Port Said. That's a tough place, and don't you think they don't pull something there.

Then we made Naples, and had a trip to Pompeii. Some of them went up to the Vatican. Then we made

Gibraltar, and then the Azores. We didn't see China, Japan, France, nor England, but put straight for the New York Yard.

The Alabama was in pretty tough shape before she finished, and she needed to get to the yard pretty badly. Her cylinder heads were lashed down with chains when she got in.

We had run into a typhoon off Manila, with consequent damage. I was in the ship-fitters' gang, handling material and tools, and I was a pretty husky youngster. I had attracted some attention by my spirit and willingness, but that record of mine held me back.

It doesn't make any difference how good a man you are in the Navy, if your record is against you. Well, they have to do it; it wouldn't do to let any man, just because he is strong, clever, and willing, override discipline. It would be telling the rest of them that if they were smart enough they could get away with murder.

After the Alabama went into dock, I was sent to Newport again to finish out my time. There was a civilian instructor there then, putting classes of seaman gunners through the course in diving. I watched some of them making their dives, and I thought, 'Gee, I'd like to do that.'

The only way I could think of was to ask, so I went up to Jake Anderson, the instructor, and asked him if he would put me down for a dive. He said, 'Yes; I'll put you down to-morrow.'

I went round next day, but nothing happened, and when the time for the others was up, I asked him again.

Again he said, 'Yes; come around to-morrow.'

Well, it was that way every day; either he put me off or said to come around the next day. I didn't realize it, but of course he couldn't do anything else. Before getting instruction in diving, a man has to pass the doctor's examination. Some men aren't allowed to dive. If I happened to be one of those men, and anything happened to me while I was down, the instructor would have to explain why he let me go down.

Finally some one explained. 'You'll never get a dive,' he told me, 'till you're a seaman gunner, going through the class.'

At the time I was an 'able-bodied seaman.' 'Well,' I said to myself, 'I'll get that thing.'

I did it, though it was not so simple as it sounds. And I am glad I did it. I liked diving from the moment I saw it; I was attracted to do it myself. I have enjoyed the work, and I like it to-day.

To go through the seaman gunner's class you have to be on your second cruise; that is to say, on your second hitch, in your second enlistment of four years. So when my time was up, I hung round a little while, and then reënlisted with the provision that I could take the seaman gunner's class at Newport. Well, I had my diving instruction, as it had been promised. My instructor was a civilian, Jake Anderson; a Dane, a good diver, and a wonderful man. He was also a fine instructor.

I wanted to be the first man in my class to make a dive. There were three other men that had the same idea. So I said, 'We'll draw straws for it; the longest straw wins.' I held the straws, but I held five straws. The fifth one was the longest one of all, and they never



had a chance to draw it; I kept it palmed in my hand and the end didn't stick out at all.

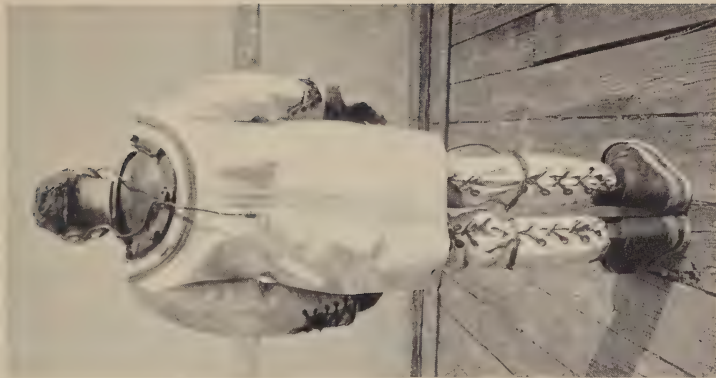
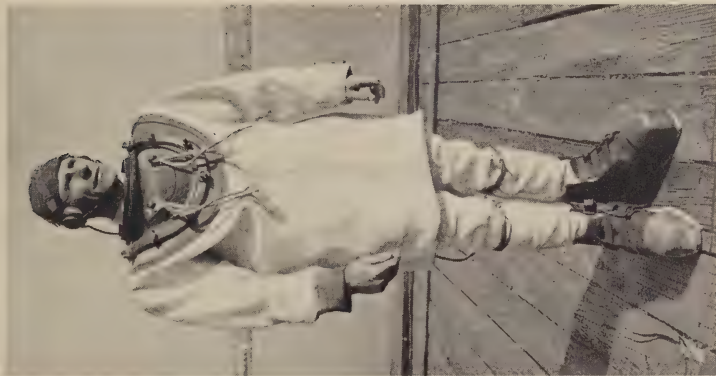
So I got the first dive, and, from the very start, I liked it. I've always liked it. People have asked me how I feel under water; I can't explain, except by saying that I don't feel the same under water as on land.

I don't remember much of the detail of that first dive in the seaman gunner's class. I had hung round so long, trying to get a dive, that I had become familiar with the gear. I had watched the men put it on, and had heard some of the instruction about using it. I knew what the valves were and how to use them, though a man's exhaust valve is set for him on his first dive. This is done so that he will be sure to get a good circulation of air; if he were to be allowed to set it, he might close it too much and possibly blow himself up, or make himself very light but keep on rebreathing his air, and get too much CO<sub>2</sub>.

The first instruction, of course, consists in explaining the gear, the suit and appliances that go with it.

There are only two firms, so far as I know, that make diving gear. One is Morse and Company, in Boston, and the other is Schrader, in New York. The Government buys from them, and they also sell gear to commercial divers.

The suit itself you might call a one-piece suit. Laid out flat, it looks like a big, clumsily cut paper doll without any head. The fabric is of good duck canvas, two layers with a layer of pure rubber cemented between them. They are made in only three sizes, for they are not expected to be what you might call a good fit, and



# FRONT AND REAR VIEWS OF DIVER PARTLY DRESSED

Showing telephone head set with connection that plugs into helmet hanging down back and lacing to prevent air from getting around feet in case diver should capsize or fall on bottom. Left sleeve shows protection over cuff; right sleeve shows cuff.



three sizes are intended to take care of men of different heights. As a matter of fact, men less than five feet six inches high are not accepted as divers, nor men who are much over six feet. So three sizes, with some leeway as to looseness, are enough.

The suit might be said to be 'cut for a low neck.' Its collar, of stout pure rubber, follows the curve of the breastplate, well down onto breast and back and — in the modern type of breastplate — well in on the shoulders. This new form of breastplate allows a diver to get through doors where the older, broader breastplate would not let him go.

Inside the collar, another inner collar of the suit itself extends well up, higher than the breastplate collar. This inner piece is called the 'bib.' If any water should get in behind the collar, this bib catches it and keeps it out of the suit itself.

The suit has reënforcement patches at knees and elbows, ankles and crotch, everywhere where extra wear comes. Also, on the legs there are extra flaps sewed on in pairs; these flaps are laced together, so as to bring the suit close in to a man's legs and keep the air out of the lower part of the suit. It lessens the danger of capsizing, and incidentally lessens the danger of an inflated suit getting punctured.

The ends of the sleeves are finished with rubber cuffs that fit tight round your wrists. They are intended to make water-tight joints, but to make them absolutely sure, we use sections of rubber tubing, just like pieces of inner tube, that hug the wrist and the cuff very tight. We call them 'snappers.' They are so tight that if you

sat round with them on very long out of water your hands would turn blue; under water the outside pressure equalizes the inner pressure and they make no trouble.

In warm weather, or in warm waters, divers work barehanded. Where it is cold, they wear gloves. The old-fashioned gloves were clumsy mittens; the newer ones have two fingers and a thumb, and are made in a curled position like a half-opened fist. They are cemented right on the ends of the sleeves of the suit, in place of the cuffs.

Through the rubber collar of the suit are punched twelve small holes. These correspond to twelve studs on the edge of the breastplate. When the suit is used, the breastplate is put underneath the collar, and the studs come up through these holes. Then a curved metal strap, in four sections, is put on, and the studs come up through corresponding holes in the straps. By setting nuts onto the studs, the strap can be squeezed down onto the collar so tight as to make a water-tight joint between the suit and the breastplate — provided the bib has been pulled up carefully so that there are no wrinkles to keep that joint open.

The top of the breastplate is cut off flat, in a perfect circle, and threaded so that the helmet can be screwed down onto it. But though there are a number of threads, sections of the circle are cut out altogether; corresponding sections on the helmet are also cut away. That is, by setting the helmet on with its stick-outs over the cut-ins on the breastplate, and then giving only a quarter turn, all the threads will engage and the helmet will be firmly screwed on. A gasket makes the joint



water-tight. It is like what is called a bayonet lock. At the back of the helmet, a lock-nut fastens it to the breast-plate.

Breastplate and helmet are made of copper, tinned over. A new one looks gray; one that has been in service is likely to have the tin gone, and shows a fine dark bronze color.

The helmet is the diver's air supply and control, his observation point, and his telephone station. Back of his head is the air inlet. His air hose comes to a coupling on the back of the helmet, out of the way; just outside of the helmet itself is the safety valve, a non-return valve. This keeps away any possibility of air going back up the hose, in case of a stoppage of the supply, or any accident.

Three feet away from the helmet on the air hose is the air-control valve, handy to the diver's hand. For the air hose and the life line are made fast with stops<sup>1</sup> to metal rings on the front of the breastplate, and are then carried back, one under the right arm and the other under the left, to their attachments on the helmet. So the air-control valve is right in front, on the diver's chest just above his belt.

The life line is really the telephone cable. It is a beautiful, flexible, but very strong yet light line, 'cable laid' instead of being twisted, so that it will never kink. Through its center run the telephone wires. They pass through the helmet in a water-tight connection. Inside, the telephone transmitter is part of the inside wall of the helmet just a little to the left of the face-plate. The re-

<sup>1</sup> Short pieces of line, or lanyards.

ceivers are on a regular head-set, which the diver wears with the receivers clamped securely over his ears. The wires from his receivers end in little plugs which fit into a connection on the right side of the helmet, inside, and the last thing before the helmet is put on is the plugging in of these wires and tucking the slack of them down into the bib.

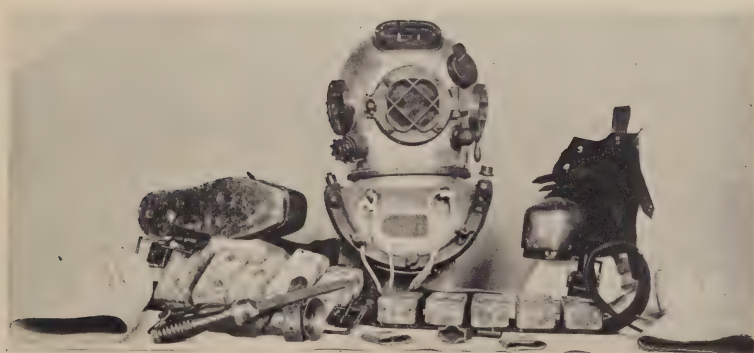
On the right side of the helmet is the escape valve for used air. It has a spring in it, and opens only when the pressure arrives at a certain point inside the helmet. By turning a handle outside, the diver can make this pressure-point higher — that is, he can hold on to the air he has; or he can make it lower and let his air escape faster. Besides that, he can turn his head and press his chin against a button on the end of the valve-stem and push the valve open to let out some air, in case he needs to and can't at the moment spare a hand.

Finally, there is on the front of the helmet, to the left of the face-plate, a spit-cock or supplementary relief valve. It is worked by a small handle outside, and by opening it the diver can blow out any water that may have got in between his breastplate and his bib.

The air is delivered into the helmet through a three-branched tube, which spreads the air for the diver. In the old helmets, it was a single-tube delivery, and came down over the forehead in a blast.

The escaping air is carried round the helmet through an outside tube and is let off into the water near the back. This is so that the bubbles won't be interfering with the diver's view.

He gets four views, as a matter of fact. Directly in



#### A PART OF THE DIVER'S OUTFIT

*Above, at left:* Rear view of helmet and breastplate, showing telephone and air connections and safety lock that drops down in groove on breastplate to prevent helmet from unscrewing.

*At right:* Interior of helmet, showing diver's transmitter, telephone connection, and one of the three air-channels. *Below,* Helmet and breastplate, shoes, belt, knife, wrench, gloves, etc.

soles. They are buckled on, and then made fast again with stops. Their principal use is to keep a man right side up, and to keep his weight down at his feet.

You can see that when a diver has got into all this gear he has got to carry a good deal. But he always gets into his dress near the spot where he is going overboard, and as soon as he is under water the weight is taken off him by the air pressure.

Divers usually wear to work three suits of 'diving underwear,' heavy woolen suits, and wear two pairs of socks. For after all, cold water is cold water. Some divers wear also the canvas 'underjacket' provided by the Navy Manual, with rubber gloves attached to the sleeves. The gloves go out through the cuffs in the suit. I don't wear the jacket, nor do I like the rubber gloves. They puncture too easily.

Some men also wear what we call the 'doughnut.' This is a cushion with a hole in it, to put on over your head and make a support for the breastplate on your shoulders. I don't care for that either. When you're at the bottom and your air control is properly adjusted, the helmet is just lifting off your shoulders anyway.

The air hose itself is specially made. It is an inch and a sixteenth external diameter, and its bore is only half an inch. It is made of five layers of linen and rubber alternately, with rubber for the inside and the outside layer. When it is new, it will stand a pressure of five hundred pounds to the square inch for ten minutes — far more than it would ever be called on to stand in service.

When the novice diver has had the suit and gear ex-



plained to him and taught so that we think he knows it, he is next taught the diver's signals. Of course, as long as his telephone is working he doesn't need the signals. But a telephone can go out of order, and then he must talk by signals with the man tending his lines.

The beginner gets only a very simple code; one pull at his line — for nowadays the life line and the air hose are seized together — means, 'More air.' Two pulls could mean, 'Less air,' but that signal would be sent very rarely, so two pulls means, 'Give me slack,' or 'Lower me.' Two pulls repeated over and over means, 'I am foul so I can't get loose — send down another diver.' Three pulls from the diver means, 'I am coming up'; four pulls means, 'Haul me up,' and five means, 'Send me down a line.' That is used when a diver has found something he was searching for and wants a line to bend on to it.

If the tender doesn't hear anything nor feel any movement from the diver for some time, he gives one pull to ask, 'Are you all right?' The answer, 'I am all right,' is one pull, and one pull also means, 'I understand,' in answer to a signal from the topside.

Two pulls by the tender means, 'You have come up too far. Go down until we stop you.' This is when a diver is coming up and getting his decompression; he can come up only so far and then must wait awhile until it is safe to come another stage.

Three pulls by the tender means, 'Stand by to come up,' and four pulls, 'Come up.' Five pulls means, 'You have reached the end of your hose and life line. You can go no farther.' Later on, if the diver is to do advanced



work, he will learn a more elaborate code of signals. But for the beginners, those are all the signals they can use.

When they have learned them thoroughly, the instructor goes on with his talk. When I became an instructor myself, I always told my classes how they should feel under pressure, and what to expect and what to look out for. I always inspire them with confidence in themselves, and tell them there is really nothing to it — as there isn't if a man keeps his head.

I told them always to hang on to the descending line; that we would be tending them, but that they could do practically everything themselves in the matter of regulating their air. I told them to use too much air rather than too little — they would anyway; almost everybody does.

If a man uses too little air, he will find it out because there will be an excess of carbon dioxide, or  $\text{CO}_2$ . It shows itself as a fog in the helmet, and dims the faceplate. Of course it is easy enough to get rid of it; you open the exhaust air valve, and then open the air-control valve, and drive it through with fresh air.

I would explain to the boys how to use a circling line — the books call it a distance line. You see, the descending line is a line let down with a heavy weight on the end of it. The diver goes down on this, and when he reaches bottom, it is cast off from the boat. You haul it down, and coil it up on your arm. Holding onto this distance line, you can find your way back to the weight. Looking for something lost, you can circle round the weight, going wider and wider.

The novice is ready now for his first dive. He gets out of his shoes, puts on the heavy socks and underwear, and gets into the suit with the help of two other men. The breastplate is put on over his head, and the collar is pulled over the studs. The bib is pulled up smooth and the straps are set on and bolted down. The helmet is ready and tested for air and for the telephone connection.

The lad goes over the side of the diving boat onto the ladder, and there his belt is put on, his helmet is twisted into place, his lines are made fast, and he is ready. One tap on the helmet by his tender tells him everything is all right, and he walks down the ladder into the water, grabs his descending line, and throws himself clear. He is down — on his first dive.

He usually goes down for the first time in only fifteen or eighteen feet of water, and stays down for twenty to thirty minutes. He hasn't any particular task; he can do just as he pleases.

Things can happen, of course, even there. The instruction is usually given alongside the dock, and if the diver gets in among the piles, he has to follow his life line and air hose back, to find his way out.

Quite a few of the boys get snarled up. You can tell if a man is excited under water by watching his bubbles. If they keep coming in a steady stream, he's all right; if he gets to panting from excitement, the bubbles come in flashes, or puffs.

Of course, in any need we should go down to help him. But we don't go down unless it is clear that he's lost his head. We let him get out of whatever situation he's in

by himself; it gives him more confidence in himself for the next time.

Some men will never make divers. Any man can go down, I believe, but not every man can dive and accomplish anything.

## CHAPTER II

### WHAT A DIVE IS LIKE

LET me see if I can give you a picture of what making a dive is actually like. I know most of the things you want to know about, because 52,385 people who have talked with me have all asked the same questions.

I'll take it that we are on the Falcon, on a submarine salvage job. And to start the day, I am asleep in my bunk. Last night, while the divers were all sitting round, Mr. Tibbals, the gunner who is in charge of the diving, came round and told us who was to dive to-day, and who would go down first; who would go on with the job he had yesterday, and who would tackle something new.

We weren't diving yesterday, we'll say, because it was too rough and we were in harbor. We worked at this and that; for myself, I was putting a new patch on my diving suit. It got cut just where most suits do get cut — on one leg. Stramming round in the dark amongst the wreckage, your legs will hit a sharp piece once in a while, and the jagged steel will tear or cut right through the twill and rubber of your suit.

When a suit comes to you brand-new, it has patches on the knees and elbows, where wear is sure to come. But for myself, I always want to put on extra ones — on the shoulders, where the straps of my belt come across and can rub; under my arms, where my life line and hose come round and can rub; and between my legs to take the wear of sliding down the descending lines.

To put on a patch is a careful job. First you must clean the place where it is to go. If the suit has been used, you first wash it in fresh water to take out the salt, and let it dry. Next you wash it thoroughly with gasoline and let it dry.

You cut your patch with rounded corners, and coat the back of it with rubber cement, and coat the place it is to go with cement also. And let them dry.

When they are really dry, you repeat—give patch and place another good coating of cement, and let them dry until the cement is no longer ‘tacky.’ It wouldn’t do any harm if you let them get an actual skin on the cement.

Then you put the patch on, and press it down, pressing from the center in all directions to the edges. Some fellows then lay it under a weight, but that isn’t really necessary.

We had supper in the chiefs’ quarters on the Falcon, as usual, and as usual after supper the talk ran on the work. Two or three men had suggestions about what we ought to do, and, believe me, they got plenty of arguments! That’s where sunken submarines are raised—on the mess table. They have been brought right up and put on the table, hundreds of times oftener than they were ever brought to the surface outside. Finally, however, somebody says, ‘Oh, quit talking shop.’ It was about this time that Tibbals came in.

I turned in early, for I was to be the first man down the next morning. It was still blowing at daylight, so I was up of my own accord and dressed before the motion of the ship told us we were outside and on our way to the wreck.



I always eat a light breakfast when I have got to dive soon, and I think you will find that with a few exceptions all divers keep the same rule. So when I rolled out from the forecastle where the divers sleep — it is an open forecastle with the bunks in three tiers — it was only a short time before I was ready.

The messenger came down while I was sitting on my bunk and said, 'They're ready for you,' and I began climbing into my woolen underwear. These suits are the heaviest woolen underwear made, and we put them on right over our own clothes — that is, I take off my coat and vest, and put them on over my shirt and trousers. Then, in a pair of slippers, I go on deck — and it is cold!

I go amidships, where my two 'bears' are waiting for me. The bears are the men who do nothing but dress the divers and care for the gear. One of them goes into the engine room, where the suits are all drying and keeping warm on a rack, and fetches me one. Here, on the Falcon, a man doesn't have his own suit.

On the station it is the habit to issue to every diver two suits of underwear; that way, a man will keep his stuff clean. If anybody takes any suit of underwear, a clean man won't wash up the suit that a careless man has let get dirty.

In the same way, a diver will usually get the same diving suit every time, and comes to think of it as his suit, and to keep it in repair, putting on patches as fast as the old ones wear thin without waiting for them to give way altogether.

The bears bring a little stool and I sit down. On a lower shelf of the stool are the wrenches and nuts for my

suit. The bears hold the suit out and I get my legs in; then I stand up and they help me into it altogether. People think that a suit is so heavy and so clumsy that a man can hardly move in it at all. Well, in the air it is stiff and thick and heavy. But as soon as you get under water the weight disappears, the suit becomes pliable, and you notice it no more than your ordinary clothes.

As soon as the suit is on, the bears bring the breastplate and straps. I like to have my tender fix that for me, because the least fold under the straps of the breastplate means water getting into the suit. Incidentally the surest way of getting wet is to have the holes in the rubber collar punched even an eighth of an inch out of the way, especially the one in front. If the collar has to be stretched to get the hole over the stud on the breastplate, it leaves a little opening on one side, and if this opening is below the stud no amount of tightening will keep the water out. So I like to have the tender — who has been instructed in diving himself, and knows all about a diver's needs — pull up my inside bib smoothly and see all fitted.

In getting into the suit, I help the bears as much as possible, and after my breastplate is on, I sit down again and they lace up the flaps on my legs tightly, and lace on my lead-weighted shoes. Now comes the belt and weights — a hundred pounds of lead. It is strapped on and I am ready for my helmet. Sometimes, though, they are not ready for me to go over, and I have to sit there and wait, say, until the descending line is not in use. Not this morning, though, for I am to be the first man down. So here comes the helmet, which has been hang-



ADJUSTING DIVER KELLY'S SHOE BEFORE HE IS LOWERED TO  
THE SUNKEN S-51



ing on a peg alongside the coiled lines, all connected up.

When I came up day before yesterday, in the hurry to get me into the decompression chamber, the helmet was laid down carelessly on the deck and got some water into it when a sea came over the side. So it was carefully wiped dry, and then the telephone in it was tested. It didn't test very well, and the helmet went to a man of the Falcon's crew who does nothing else but repair and take care of helmets. He put it right, and it has been on the peg since.

The bears bring my head-set and put it on me — a cloth helmet with the ear-pieces on it, and with a strap to go under my chin. You can't take a chance of the thing's coming loose and coming down over your eyes inside of a helmet, where you can't get at it.

The telephone has to be tested again now. So they bring it over, and connect up the life line that has the telephone cable right through its center, and hold the helmet up to me, and plug in my wires from my head-set, and let me speak into the transmitter. If the tender hears it well, he says, 'O K on Eadie.' Then I stand by, and the bears connect up my air hose to the inlet on the back of the helmet.

Finally, they are ready for me to go; the helmet is brought again, my wires are plugged in, the slack of them is tucked down inside of my breastplate, and the bears lift the helmet onto my head and settle it down on the breastplate. One good twist sets it down on its gasket, and they lock it in place by turning down the lock-nut at the back into a recess in the breastplate.



My lines have been cast off — a loop or two — from the rack on the bulkhead where they were coiled up, some six hundred feet of them. The ends are brought to me, and secured onto their connections on the breastplate. Swiftly the bears carry the bight of the lines under my arms, and make them fast on my breastplate with the rope stops hanging there, and I am ready.

The stool has been purposely placed very near to the stage — a flat grating hung by iron ‘straps’ at the four corners; they go up in pairs to a bar overhead, and this bar is fast to a wire cable that leads to the end of a boom, high overhead, and thence to a donkey engine. The engineer of that engine stands there all the time a diver is down; somebody is right at the throttle all the time. My bears help me walk the few feet to the stage, and I step on it and hold on to the straps. Then a man taps me on the helmet to tell me, ‘All set.’

By this time my tender is at the rail, with my sewed-together life line and hose in his hands. It may be explained that when a diver is working on a submarine, the sixty-five feet of his air hose and life line nearest to him are sewed together in a canvas jacket. This is to reduce the chance of tangling when he is inside of a submarine, and sixty-five feet is sewed because that is about the limit of distance he is likely to go from the hatch, inside of the boat.

My telephone tender has his head-set on and is in connection with me. He is sitting well back from the rail, apart from other men so that any talk on the deck may not come through to the diver and make him think the topside is talking to him.

One man has the diving log, a book in which he writes down, constantly consulting his watch, the name of the diver going down, the job he is to do, the time he goes over the side, the time when he reaches the bottom, and the length of time he stays there. This is all vital, and is rigidly kept.

Gunner Tibbals is on the deck, and standing by, every minute a diver is down. He is in charge of the divers, and it is he who decides whether diving can be done. Captain Hartley, the commander of the Falcon, stays on deck practically all the time, handy to the telephone tenders. The salvage engineer, Ellsberg or Saunders, is there also a good deal of the time, though he may go to the cabin to study out some problem of the work to be done.

The sea is slapping along pretty lively, and many hands steady the stage as you are swung up into the air by the donkey engine and eased down into the water. Down you go steadily, turning your control valve a little to take a little more air, just inflating the suit slightly.

One little wave slaps up over your helmet, and then you are below, with the sound of the air rushing into your helmet. As soon as you are under water, they stop lowering. You test everything, and speak to the telephone tender to make sure that the telephone is O K. You try your valves, make sure there is no leak in your suit, and then say over the telephone, 'Everything is O K.' And you can hear the telephone tender report, 'Eadie says everything's all right.'

You won't hear the next, but your tender will also report, 'O K on Eadie.' And the gunner in charge,

Tibbals or Loughman, will say, 'All right, go to the descending line.'

Your telephone tender will repeat, 'Go to the descending line.' You know that this is the next thing, your tender knows it, and the gunner knows it. But it must be said so that all hands will work together at the proper minute.

You step right off the stage into water a hundred feet deep, inflating your suit a little as you go, to make yourself light. The tender keeps your lines taut, and walks along the rail the ten or twelve feet to where the descending line is.

As you come to it, you wrap one leg round it, and open your exhaust valve a little; also your control valve a little at a time as you go down, to overcome the increasing pressure. You slide down the descending line, which of course isn't up and down, but off at an angle from the ship's side.

We'll say that this morning my job was tunneling under the sunken submarine, to make a hole through which to pass first a light line, then a stout one, then a wire cable, and finally the great chains that are to be fastened to the pontoons and take the weight of the submarine when we lift her.

All right; then the last thing that happened before they swung me over the side was to hand me the nozzle of a four-inch fire hose with a becket on it. I slipped my arm through the loop of the becket, for I must have both hands free.

It's a lucky morning, for there isn't enough slack in the descending line to land me in the mud, off the deck

of the submarine. I come down squarely on the deck, as I can tell by the feel when my shoes hit it, and not far from the gun-mount where the descending line is made fast.

Remembering carefully which side of the descending line my fire hose and lines were, I back away from the descending line and move over to where I know there is a stanchion on which I can take a turn of the fire hose. This is so that if there is any pull of the tide against that hundred feet of fire hose, it won't all have to come on me; I shall get only the pull on the length from the stanchion to me.

My orders were, we will say, to tunnel at Frame 47. When I got them, I looked at the blue-print of the submarine, which was used all the time to locate different things aboard of her, and found that the frame was — say — about abreast of the muzzle of the gun.

I had a length of light line, and made it fast at the deck, right abreast of the gun, and lowered myself and the hose nozzle over the side and into the soft mud. You'll go right down into the mud to your waist, at once, for this mud is the soft mud that was pushed up in a lump by the submarine when she settled.

If you have to walk in such mud, you make yourself a little buoyant by closing the exhaust valve a little, so you are almost treading water. Even if you were to go into the mud right over your head, you could get out this way, by making yourself a little buoyant, and rolling your body, making an open cone of water. You'd come right up out of it.

But here we are, abreast of Frame 47. So we unsling



the nozzle and telephone up to the topside, 'All right, give us the water.' This is not the first word you have spoken; when you hit the deck you telephoned up, 'All right; on the bottom'; and your telephone tender reported that fact to the man keeping the log. He noted the minute, for it is important to bring you up when you have been down an hour, though often, to finish a piece of work, they will let you stay down even fifteen minutes over the hour, or more.

The fire hose swells as the pressure comes on, and you go to work hosing the mud away from the submarine's side. You wash out a large space backward first, to make a place for the mud to flow, and then go at it facing the boat, and turning every few minutes to wash away what has piled up behind you.

Somehow the impression has got round that the tunnel is a circular hole so small that you must slide into it feet first. Of course, if you did that you would simply bury yourself. No; you wash a hole big enough and deep enough to stand up in. Also, you keep feeling the curving bottom of the submarine, to make sure your hole is going straight down at right angles to her.

After so long a time, the topside may telephone down, 'Carr's coming down to relieve you' — or whoever it might be. And in a few minutes here he comes into the hole. You can't see him, of course, in that pitch blackness, but he follows your hose into the tunnel, and comes alongside you and taps you.

You give him the nozzle, and back out of the tunnel, again making as sure as you can that you haven't taken a turn with your hose and life line round the fire hose





DIVER GOING DOWN TO WASH A TUNNEL UNDER THE SUNKEN SUBMARINE

They are handing him the hose nozzle. The man with his leg over the rail is tending the life line of another diver



or — when you get out — round the other diver's lines.

The small line you left hanging down over the side helps you, with a little buoyancy, onto the deck of the sub, and you feel your way over to the descending line. Then you telephone up, 'At the descending line.'

They answer, 'All right, stand by.' And you do just that, standing there until they say, 'All right, come up.'

Again you wrap your leg round the descending line, and make yourself a little buoyant. You begin to ride the line up, and your tender, on deck, is hauling your lines in gently as you ascend.

At the forty-foot depth, or, if you are working in deeper water, at the sixty-foot depth, you will see the stage waiting for you overhead, shackled to the line. They know on deck that you are near it, for as they hauled your lines they counted the connections that came up. So they ease up on the hauling when they know you are near the stage.

You catch it, and haul yourself onto it. Then you telephone again, 'All right — on the stage.' And you can hear them say, 'Eadie's on the stage.' In a moment they'll tell you what they want you to do — usually it is to unshackle. That is, you take out the shackle-pin, release the descending line, and put the pin back. This leaves the descending line clear for another diver to come up or another diver to go down.

When working inside of the submarine, there will be always two men together, and sometimes three, for one must stay on deck or at the hatch to tend the lines of the other or the other two, inside.

There may be even two teams of divers down at once, working on different parts of the sunken sub. They don't like to have too many down, for if a squall came up suddenly, and there was enough of it to make the Falcon drag her moorings, and there were five or six men down, and some of them were inside, where it takes a man five or six minutes to get out, it's odds that some of those divers would find themselves in a bad fix.

The gunner in charge of the diving is always watching the weather, keeping track of how long a man has been down, and not letting the situation get complicated. For when all's said and done, a man's life is always at stake when he's below and absolutely dependent on his tending for his safety.

Well, you're on the stage, taking the first of your decompression. You know, you've got to take as long coming down to atmospheric pressure as you have stayed under higher pressure.

If you take your decompression on the stage, say at forty feet, you can do anything you please. Brisk exercise helps to 'desaturate' you, or drive the nitrogen out of your body tissues. If you're alone, you may be doing calisthenics or shadow boxing. If there are two of you on the stage, you may be making passes at each other.

When we were working at one hundred feet deep, as at Provincetown, they put us on the stage at the sixty-foot depth and kept us there three minutes. Then would come the telephone message, 'Up ten.' Up would go the stage to fifty feet; even with that ten feet, you could feel the relief of the pressure.

They would leave you at fifty feet for eight minutes.

Then, instead of going ten feet more, they would haul you right to the surface. It has been found that it is safe to do this if the man can be rushed quickly into the decompression chamber when he gets aboard.

The stage breaks the surface, and you are swung up and over the rail, still standing on the stage. The helpers come to you and remove your helmet in one twist, letting go the life line and air hose on your breastplate. At the same time another man is down getting your shoes off.

They work quickly. Off comes your weighted belt, and a man takes you by the arm, and, keeping outboard of you helps you, as fast as possible without running, to the decompression chamber.

They haul you all the way up instead of letting you take your decompression in the water because of the cold, and the fact that you can't keep your circulation going by work. They won't let you run to the chamber because of the danger that you might fall and lose that much more time.

The decompression chamber is a big cylinder amidships. There is room enough in it for five men to sit on each side, though that is the limit. This morning I'm telling about I, being the first man down, have the chamber to myself.

There are two airlocks on it; one where we get in, the tender helping me through the rather small round door. There is a chamber tender inside, and, as soon as I and my tender get in, the outer door is closed and the air pressure is turned on.

The tenders help me out of my suit, taking the straps off the breastplate and getting that off the rubber collar.



The rest is just pulling off the suit itself. Then I get into the inner chamber, which of course is larger than the airlock, and the chamber tender comes in with me.

If I'm cold, there are blankets in there. I can ask for something to eat, and it will be brought and put into the 'medical lock' at the far end. The air pressure is running up all this time; having come from the hundred-foot depth I get a thirty-pound pressure.

The place is warm, for there is an electric heater. I may nap, or I may ask by telephone to have somebody fetch the book I'm reading from my bunk, and put it in.

Anyway, I have to spend an hour in there. During that time the pressure is 'bled' down, five pounds at a time, to represent a ten-foot rise. The decompression tables show how long you must stay at this level and that one. When the pressure is all gone, your dive is over.

Back to your bunk; off with the diving underwear, and, if you're tired, cork off.

When you have been down for a dive on a job like the S-51 job, and have finished it, and got into the decompression tank, if there are two or three more taking decompression at the same time, there is always something doing. We used to try different games on each other to see who would buy candy for the gang, and there was one man in particular whom we always hooked, every time he came in.

He fell over and over for the same old game. What we did was to put slips of paper in a hat and have all hands draw. Nobody would say anything for a moment, when all had opened their slips, we would wait

for this fellow. He would unfold his paper with an anxious, eager look; then his expression would change and he would say, 'Hooked again!'

Every paper in the hat had written on it, 'You are it,' and he never knew until the job was over that they were all alike.

## CHAPTER III

### WITH THE OLD PIG-BOATS

My actual diving instruction lasted only two weeks. The rest of eight months I spent learning torpedoes, air compressors, and mines. Then I went into the submarines when submarine duty was volunteer duty. That was in 1909, when the boats were named instead of being numbered and lettered. I was assigned to the Tarpon, and I can tell you we had some funny experiences.

One day we were in Boston Harbor, in President Roads, for a submerging test. The skipper was taking in water gradually, nice and easy, and drifting down the line as he did so. The first thing you know, just as we settled on the bottom, something hit us — *whang!*

I was at the telephone, right alongside the skipper. I was then a third-class gunner's mate. The whang was followed by a scraping sound; I thought sure somebody had dropped his anchor on us and it had slid down over our body.

The skipper said to me, 'What's that?'

'Somebody's dropped his hook, sir,' I said.

*Bang!* It came again, and *scr-r-rape* along our side.

'This is no place for a minister's son,' says the skipper, and backed carefully till we seemed to be clear. Then he came up, and what do you think it was?

We had drifted right down under the scoop of a big dredge, and he'd been dredging us!

Another time we were in Provincetown. We went outside for a dip; I should say we were just about where the S-4 disaster happened. The skipper started to take water in his ballast tanks, and all of a sudden she dropped, and kept on going till she hit.

We blew everything, and she stayed there. We stayed there for hours. Here's what happened; we didn't come up.

Well, of course after a while the air got foul. And what we did wasn't because we didn't realize our condition, as you might think. It was simply that we had confidence in our skipper. Anyway, we all went to sleep while she stayed and stayed, hour after hour.

When she did let go — I figure we were on the bottom over eight hours — she went up like an express elevator. We all woke with a jerk, and I went to the central operating compartment.

The skipper was standing there, and he says, 'If this ever happens again, some one stay awake and keep me company. It's darn lonesome.' He had stayed awake all through, all alone. The rest of us slept after three hours.

We figured that she hit so hard that she was held by suction in the mud even after we had blown all the tanks. Then when the tide turned it cut under her enough to loosen her, and up she went.

I was in the Tarpon four years. Those were the days of the old gas-burning subs, and we had trouble a-plenty with men poisoned by the gas.

A man can inhale gasoline vapor for some time, and keep going if he will stay in the vapor. But let him hit

the fresh air, and his eyes will bulge, and he'll stiffen up, and Lord knows what he'll do next. More than once we've had to put a fellow out with one on the chin, to save him and save ourselves.

I never got it but once, badly. I realized that I had got it, and I wouldn't go up the hatch, but stayed below. I was in charge of the engines, and I decided that I'd oil up everything. I made up my mind that if we ran her to Boston we'd get there well oiled. And I oiled every hole I could find, till somebody stopped me.

We had fires. We were at Norfolk Navy Yard charging our batteries. We had just finished charging, and a fellow went to disconnect the charging cable at the switchboard. We figure that he got his wrench crossed and made a short circuit. Anyway, the wrench fell in a shower of molten metal; the switchboard fused and burned him horribly, and the gas in the bilges took fire.

We got the poor fellow on deck, and the skipper sent everybody ashore but himself, the chief gunner, and me. Then we three shut the hatch and set out to kill the fire.

It wasn't a pleasant prospect, for the flames were round the air compressor bottles, which were charged at 2200 pounds. The first thing I did was to get forward and shut off the gasoline supply to the engines. Then we tackled the fire in the bilges with sand, which was kept handy for the purpose, and put it out.

We had battery explosions. One of these happened at the Norfolk Yard, too. It was a lucky one; nobody was hurt, though if it had happened an hour or two later ten to fifteen men would have been hurt. But we were charging batteries, and all hands were at breakfast.



I was on deck, and I saw the forward deck rising slowly before my eyes. I rubbed my eyes and looked again, but the deck was still bulging up. What had happened was that some salt water had got to the batteries, and the chlorine gas was swelling up under the deck. Now that deck was covered with a rubber sheeting to keep any water from the batteries, and the sheeting was protected with a covering of linoleum.

The gas kept expanding and generating, and the deck kept bulging and rising. Finally something had to give, and *bang!* Away went the deck covering. But as I said, nobody was hurt.

I didn't stop diving just because I was in the submarines. In fact, they used me for diving for the whole flotilla, and for experimental work besides.

Somebody had invented an 'escape helmet' for submarines. The idea was this: there was one of these helmets for each man on board. The first man who was supposed to escape from the sunken sub was to put on the helmet — it had a body piece that came down to the waist or a little below, and the lower edge of this was weighted with hooked-on weights.

He was to climb up into the conning tower and close the lower hatch behind him. Then he was to vent the upper hatch and let the conning tower fill with water. Otherwise he couldn't open the upper hatch against the outside pressure.

When the conning tower was full, he was to climb out, and close the hatch behind him so the next man could use it. Then he was to stamp three times to tell the others inside that it was the next man's turn.

The next thing he was to do was to turn his head in the helmet. There were two little tubes, and he was to blow into the left-hand one. This would inflate the air-containing part of the suit, and the water would rise inside of it up to his neck. Next he was to drop off the weights, and turn his head to the other little mouthpiece and breathe in it with his mouth only. His breath passed through a packet soaked with oxalite, or oxylite, a compound that was supposed to purify the air so he could breathe it again. As he dropped the weights off, of course he would rise to the surface — and there he was.

They wanted me to try this escape helmet, off Gloucester. Well, I said I would, and they took me out in a boat and dropped me over the side the same as in a regulation diving outfit. They stood by in the boat, and when I got to the surface I opened the face-plate of the helmet. It was set up like the face-plate in a diver's helmet, except that it was only hand-taut, and could be unset without a wrench.

When I got it open, the officer in charge said, 'See if you can swim in the thing.' Well, I stretched out and swam, and they saw I was all right, and began to row away from me. I was stroking along, lying down to my work on my side, and I began to notice that all was not well.

The salt water, you see, was flowing into the face-plate opening. Well, that was all right; I didn't care for that. But presently it got into the oxalite — and set it afire. It began to smoke, and the smoke was right in my face. I couldn't get rid of the thing in any way, and the wetter it got the faster it burned.

By this time they weren't paying any attention to me in the boat. I was yelling, 'Hey!' at every stroke, and smoking like a steamboat. It wasn't burning my face, for the cold water attended to the heat as fast as it was generated; but it was choking me to death, and I had hard work to make them hear in the boat. I don't think much of that device.

I was known as a good diver in the flotilla. There wasn't anything I wasn't willing to tackle, and I made good on the jobs. My first one was a volunteer job, recovering a sub's anchor in a hundred and twenty feet of water, diving from a hand pump.

That may need a little explaining. On a station, or working from a regularly equipped diving ship like the Falcon, the diver gets his air from storage tanks. It is cool; it is clean; and any pressure desired can be had. But if the flasks are not to be had, he has to be supplied by the old-fashioned, double-action hand pumps, worked by man-power. That air may come through oily and nauseous; it is almost sure, if you are working at high pressure, to come to you hot. And the deeper you are, the harder it is to pump, and the harder to keep you supplied with the pressure you need.

The sub's anchor was lost off the Capes, on the regular anchorage, when her wire cable parted. Its position was buoyed approximately.

I didn't choose my helpers. In the first place, I had confidence in my own ability to get out of a mess if they fell down on me. In the second place, I wouldn't slight any man by passing him over in my choice.

They put four men on the pump and one man on my

life line, a separate one taking my air line. I went down on a descending line, made my circle, and felt my circling line — they call it the distance line — foul something. I went ahead just far enough then, crouching low against the current, so that I got the obstruction at an angle. Then I went in on my line till I came to the anchor. I was able to trace out the chain and wire cable to its end, and from there signaled for a line. They sent me one down, and I bent it onto the wire cable and came up.

It sounds simple, but of course there is a lot of detail to groping around on a sand bottom at a hundred and twenty feet that is difficult to do and impossible to describe. Anyway, I had done a seamanlike job, and done it quickly; and after that, when there was a diving job to be done, it was a case of 'get Eadie to do it.' And there was a lot of diving to be done.

I remember one peculiar job in the spring of 1911, at Annapolis. We thought the Tarpon had lost her anchor, for we had tried to let go the anchor and couldn't. We needed to let go pretty badly, too, for a storm had caught us. However, there was nothing for it but to put into Annapolis, and since we couldn't anchor, to go to the dock.

I had to go down in the dock, to find out what was the trouble. It was bitter cold and I had no gloves on my suit. I went into that ice water barehanded and took a crowbar with me.

I found the anchor was jammed in the hawse pipe with a bight of cable, but I was able to pry it loose with



my bar. That was the job. In the meantime, my bare hands had swollen in the water-tight cuffs of my suit till they looked like raw hams. They were so painful that I couldn't let anybody touch them, and to take hold of anything to help myself was sheer agony. They had to cut the suit off me that time.

Another time I remember we were going to Guantanamo and were being towed by the Castine. We had two new officers aboard who after instruction were to be our captain and executive officer.

The Castine pulled us right head on into a fine storm, and nothing we could signal would make her let up. We were just helpless on the end of a towline, in the storm and the night. The biggest part of the bridge carried away, and I was able to steer only by keeping a lashing on me and the periscope.

About two o'clock in the morning I smelt chlorine, and I said to the skipper, 'You or I below, sir.'

He said, 'What's that?'

'Chlorine,' I told him.

'You go,' said he.

I went down, and made a straight run for my own locker. I pulled my clothes out and soaked them into a bucket of water, and then ran along, slapping the men, who were all asleep, with the wet clothes, and waking them. I'd say, 'Keep that over your nozzle!' and get along to the next one.

When I slapped the exec. awake, he said, 'What's the matter?'

'Chlorine,' said I, as I had said to the others. 'Keep that over your face.'



What had happened was that about a ton of seawater had slapped down the conning-tower hatch and had got to the batteries. There was nothing we could do; we couldn't cast off our towline nor make the Castine let up; we could only sit around waiting for something more to happen.

The gas finally worked off and toward morning the wind dropped some. When the exec. came on deck he said, 'I thank the Lord I'm here this morning!'

I said, 'Stick around awhile, sir; you ain't seen nothing yet.' You can get away with a little free-and-easy talk to an officer in a sub, where a few men are in such close contact day in and day out. There isn't the formality there is on a battle wagon.

## CHAPTER IV

### A CIVILIAN DIVING INSTRUCTOR

My time ran out on my second enlistment at Guantamano, or rather, it was coming so close to the end that the Navy shipped me back to the States to be here when my time was up. I was paid off at Norfolk and came back to Newport, for I had married in 1911, and my wife was living in Newport.

She had never liked to have me in the subs, though I was out of them before we ever had our first major accident. I like submarine duty; there's many a thrill in it. But she had grown extremely nervous while I was in them, and I thought I would best take a little vacation and take her away for a rest-up. So I stayed out, and didn't reënlist.

We traveled about for a while, till one day she said, 'Here, do you know you're getting to the bottom of the pile?' She had charge of our money.

'No,' said I. 'How much have we got left?'

She told me, and I was struck dumb. We were in New Bedford, and I judged we would do well to head for home, and full steam ahead at that.

Next day I went down to the New England Navigation Company, and I had my overalls rolled up under my arm, too, ready for work.

I struck the timekeeper at the gate first, and it went about like this:

'Hiring anybody, are they?'

‘What do you do?’

‘Anything.’

‘Anything special?’

‘Ship-fitting.’

‘Portuguese do that here.’

‘What do you advise?’

‘There’s a chance in the boiler shop.’

‘Who’s the boss?’

‘Flo Sullivan.’

I went down to the boiler shop and found him. I knew him by sight. So the next one was like this:

‘I’m the man you sent for.’

‘Ready to go to work?’

‘Yes.’

They had a little traveling crane in that shop and it was worked by hand, and there was an old, old man working on it, hauling at the chain falls. Well, I’d been having it pretty soft, and my hands were like pulp. Inside of an hour, I had quarter-dollar size blisters all over them. By noon the blisters were split. When I got home and started to wash my hands for dinner, the cold water hurt so I hollered. And that brought my wife down on me.

‘Quit it,’ says she, ‘and go back in the Navy.’ But I kept thinking that if that old man could stand it, I could, and I stuck — at \$1.92 a day.

Now Jake Anderson, my old instructor, lived near me. He had an assistant on his job at the navy yard, and one day the assistant was let out and a friend who lived in the house told me. So I went round the corner and told Jake I’d heard he’d lost his assistant, and that, though



A GROUP OF THE DIVERS ON THE S-4 JOB  
Carr and Eadie, the first two men down, in foreground



DIVERS WHO WORKED ON THE S-4, WITH JAKE ANDERSON, WHO  
TAUGHT EADIE TO DIVE  
*Left to right: Mattox, Eadie, Anderson, Burd, Carr, Michels*





I was working, I'd rather work with him. I asked him to give me a boost at headquarters, and I guess quite a few fellows recommended me.

Anyway, I went over to see them — on a Saturday, so as not to lose a day's pay — and said I'd come to apply for the diver's job.

Everything seemed to be going along all right, and finally the officer said, 'It pays \$3.04 a day. Is that O K?'

Was it? I kept saying to myself that I mustn't let him see how tickled I was. So I hung my head down as if I were considering it, and kept saying, '\$3.04 a day, \$3.04 a day.'

'Well, you know,' says he, 'you'll get more later on.'

'Oh,' says I, 'if there's more later on, that's O K.'

When I got home and told my wife, we did a dance from the parlor to the kitchen. 'We're rich,' says she. 'We can have anything we want now.'

So I was back on the job with the man who had instructed me in diving. Shortly after that, there came a job where he'd take one dive and I'd take the next.

The Vesuvius had fired a torpedo, and it sank in ninety feet. It was my dive, and I went and got it. Meantime, while I was down she had fired another one, and that sank too.

They told me, when I came up, and I said, 'Don't take the suit off; I'll do it.'

Jake said he would go, but I said, 'No, there's no use shifting. I'm in my suit and I'll go.'

Jake just turned to the men in the diving boat — he was in charge, of course.

‘Buoy that torpedo well,’ said he. And of course there was nothing for me to do but to climb aboard. With that we started back to the station, and he went down and turned in his resignation. He insisted that when he couldn’t do his share of the work it was time for him to resign, and nothing would change him. So they gave me his job as instructor.

We had big classes then. I did diving work myself, of course, and besides that I think that between 1913 and 1920 I probably instructed two thousand men in diving.

I have learned that the biggest part of diving is on the topside. No matter how good a man may be, if you have incompetence topside you can stop him. If he has nothing but the task before him to think of, even a less good man can make good.

I remember one time when I was clean out, on the bottom, on just such reasons. I was down after a torpedo and diving from pumps. While I was circling, I came across my air hose, lying on the bottom. I signaled to take up the slack — and they gave me more.

I coiled the hose up on my arm. Then I began to come across a length of my life line. I coiled that up on my other arm, and went ahead with my work. But I noticed that I was beginning to breathe hard — carrying all that stuff — so I signaled to come up. And they sent me down the torpedo line!

Well, I was just bull-headed. I thought, ‘I’ll beat them,’ and went ahead searching, and saying over and over to myself, ‘I’m all right, I’m all right, I’m all right.’ And then I went out.

I came to and felt a jerk of my line to mean, 'Are you all right?' Well, I was in such a condition that I didn't know whether I was or not. I didn't answer. They jerked again, and I didn't answer, so finally they hauled me up.

I took fifteen minutes' rest, gave them a fine bawling out, went below again and got that torpedo. Oh, after Jake left many a thing happened.

I have had to search for things on the bottom as large as a Whitehead torpedo and as small as a diamond ring. And I found the diamond ring, too, though on account of the nature of the bottom it was a long chance against me. You can find a ring, or small object, on sandy or gravelly bottom, where it lies up and you can see it; but in soft, black oozy mud, hardly more than the consistency of cream, the chance is a harder one.

This happened during the war. One of the fellows in the naval reserves lost his ring at the pier off the armory; I think he was taking a wash, and the soap made the ring slip off his finger into the bucket. Then when he threw the water overboard, the ring went with it.

All I knew about it at the time was the word that came to the station that there was a job at the pier, and for me to go over there. I took the diving boat and some members of the class then under instruction.

They told me where the ring was, as best they could. I made my boat fast alongside the pier and lowered a weight about four feet off the place where they thought the ring lay, to take no chances of the weight going right down on the ring and pressing it into the mud.

Then I went down. There was only about twelve feet of water, but the mud was so soft that it clouded up the water and I couldn't see at all. But I worked up against the current, and I hadn't walked more than four feet when I saw what looked like the gold part of a ring. I stuck my finger very cautiously through it and raised it up. It was the ring all right, and I pushed it safely on my finger, and said through the helmet to it, 'Ah, baby!'

Then I signaled to come up. The ring, by the way, was ten feet from where it was supposed to be. The owner of it was on the pier, and he was disappointed when he saw me start up, for he thought, of course, I had failed and given up. Even my tenders were disappointed, for I had been down just thirteen seconds. I got fifty dollars from the owner for that; it was the fastest money I ever earned.

I have found numerous other rings; one I got that had been lost overboard from a ferryboat. The man who lost it was leaning on the rail and it slipped off. He had the wit to take bearings quickly, and could tell me close enough to where it was so that I found it.

Two watches I remember. One was lost by an officer off the testing barge when they were hoisting a torpedo aboard; the other was lost off my boat. This second officer wanted so badly to be sure I would get the watch that he offered to bet me I wouldn't.

As a matter of fact, that was also a rather hopeless-looking proposition. When the watch went overboard from the boat, they at once lowered a weight, with a buoy attached, to mark the spot. But the line wasn't



quite long enough, and while they were bending on a second line the tide drifted the boat.

When I got to the bottom, I could see the groove in the mud where the weight had dragged along; it had acted practically as an anchor for the boat. I couldn't tell, of course, whether it had been dragged purposely to bring it down to the right spot, or whether it had been dropped right and dragged afterward. So I didn't have too much hope.

I followed the groove up to its end, about sixty feet, and started circling there. It was rather hopeless, as I said, but I found it.

Searching for small objects, your success depends mainly on how you start to work. A man can be to blame himself for his failure. If you have a weight on the end of a descending line, or a marker buoy, to start from as a center, you find out first which way the tide or current is running. Then you take just a little line out to one side, across the current, and start facing it, looking both sides of you and close enough to your weight so that you can see right to it.

When you get directly upstream from the weight, of course, the mud you have stirred up will be running away from you, and you can't see anything at all. So it is of no use to go any farther that way.

You turn right round, and go back over the ground you have searched. As soon as you are downstream at all from the weight, the mud will be leaving your ground clear, and you can see all the way round, and up the other side, till you are again upstream from the weight. Again you stop and turn, making your circle, of course,



a little wider. That way, you have a chance; if you go all the way round in one direction, you haven't a chance at all, practically.

To prove that this is right, I have never yet gone down for anything like a ring or a watch and failed to find it.

Almost everybody that talks with a diver asks one question, Can you see under water?

Yes, you can. The only reason that people in swimming think you can't is that they don't stay under water long enough to get used to the diminished light and the quality of it. They dive, and as they go down in salt water they see through the water first as white, then as greenish, and finally, as they get deeper, as blackness. In lake water, the change runs through brown to black.

Seeing under water depends on two things, principally. One is the kind of bottom, and the other is the state of the sky. On a bright day, and on a sandy or gravelly bottom, you can see for ten feet all round you at a depth of one hundred and twenty feet. You can't see so far on a cloudy day, and on a mud bottom on a cloudy day you can't see anything at all and have to go by feeling.

Most harbors have muddy bottoms, and there is hardly any of what you would call a real black, muddy bottom in the open sea. In some places there is clay, and in others there is sand and gravel. Then, of course, there is always a certain amount of rocky bottom — under-water ledges. I have had to climb down one of them for sixty feet, just like finding your way down a

ledge on a mountain ashore. That time when I went down, I went sixty feet and landed on a rock. But when I went to the edge of it, I had to go down sixty feet more, climbing down, as I say.

I don't know what you would call the view at the bottom. Of course, in a way it is a landscape, yet it lacks the look of what one means by a landscape. It isn't exactly a seascape. Perhaps the only thing you can rightly call it is a 'bottom-scape,' with the harbor mud for the black bottom.

The bottom is just like the ground ashore. If it is sand, there may be ripples on it where the current has dragged it. Perhaps there will be a rock sticking up here and there. On mud, it is just a smooth, slick plain, except where a torpedo maybe has ploughed in and made a hump, or something has dragged along and cut a furrow. But there are always little rises, and little hollows — just as ashore.

Marine growths are for the most part right near the shore line. Rockweed and kelp don't grow in deep water. Eel-grass grows only where some tributary brings down fresh water to mingle in the salt. It is terrible stuff; it grows as long as twenty feet; it is tough, and can hold on to your lines so tight that you can use yourself up trying to force a way through it.

Of course, the water gets denser as you go down, but this changes the quality of the light more than anything else. It doesn't practically reduce the distance you can see.

You can't see at all when you first go down, nor until you get used to the diminished light. But if you stand

still for a minute, you will begin to make out things. I made a practice of shutting my eyes for a little while, to accustom them to the dimness.

At night, or working inside a sunken submarine, we use lights, of one thousand-watt power. They are nuisances, in a way, because of the danger of getting fouled. Also, when we first go into a submarine, we always find that the dirt has piled up in her and every movement stirs it up. The light won't help you much then; the water is so full of the drifting particles that it looks like a thick snowstorm.

As we go on working, the circulation of water caused by the divers' movements and the stirring it gets from the airescaping from our helmets drives the mud out, and about the time you get the job done, you can see pretty well. I have often thought it would help a good deal if they could set up a framework on the deck of a sub, put a flood-light on it, and keep it going for the use of the divers.

Diving at night, of course, is entirely by feeling. You can't search successfully for small objects, but you can find a big thing, like a torpedo. They avoid using divers at night as much as they can, but on submarine salvage jobs the work goes on night and day; it is always uncertain how long good weather will last, and every minute of it must be used while it does last. But there again it makes little difference so far as the work inside of a sub goes, whether it is night or day. We have to use the light, anyway.

Diving at night is a pretty sight when the water is 'firing,' as the fishermen say. You can move your hands

up and down in front of you and carve flames in the water. Of course, these flames don't illuminate the bottom, nor help you to see your work, but they certainly are pretty.

The only incidents in a bottom-scape are the fish. Cod and haddock you may see where there is rocky bottom; on sandy bottom you get flounders and soles of all sizes. I have speared nice ones; I always tried to spear them up near the head. You spoil less meat that way.

The way to secure them is to stick the spear through them, then reach down and push the fish up the spear; a stop at the top of the handle keeps them from going off. And I learned this: it is little use to try to spear a flounder if you are standing behind him. Every time you move up to him, he will move on. The way to get them is to meet them head on.

I have speared skates. The first one I got was in Newport Harbor. I saw this big thing and speared it. Then I remembered hearing about the dangerous sting-rays or stingarees. They are just like skates, and I had heard that they had a poisonous spike near the end of the tail. This one had a rough tuft, and I was afraid it was a stingaree, so I put one foot on each edge of him, and made a sieve out of him with the spear. He was so strong I could hardly hold the spear when he wrenched it this way and that. When I thought he was harmless, I let him go, and I was as glad to see him go as he was to start. He was nearly as big as a blanket.

In my time as diving instructor, I have handled more than two thousand youngsters in diving, and have never



had even a minor accident with any one of the students. A diving instructor has practically got to do the thinking for the student in his first few dives. His is the responsibility.

I have always made it a practice to try to get every man to qualify as a diver; I believe every man can qualify, though by no means every man will make a diver after he has qualified. There was one man, however, that I could not get even to try a dive. I talked to him and told him how simple it was, and how there was nothing to it. But he wouldn't take the chance, so we threatened to put him into the suit anyway. I told one of the men to grab him, but he dodged the whole gang, dove overboard, and swam ashore.

I am fond of playing 'acey-deucey.' While a student would be down on his qualifying dive — which calls for an hour on the bottom at sixty feet depth — I was likely to pass the time myself by playing a game with any one who thought he could play; to this day the divers who graduated under my instruction insist that I always left them on the bottom longer than their time unless I won. They say I would never tell the tender to send a signal to the bottom to ask if the student was all right unless I threw acey-deucey.

There was always some goat-getting joke going on; you had to watch your step all the time. One of the tenders put rubber and oakum in my pipe one day, and I tasted it for a week. He knew I would get back at him somehow, and he was very cagey for a week.

I noticed that he always looked very carefully into his boots before he put them on. When I thought he



had got over worrying about them, and I could get away with it, I put about a quart of molasses into his left boot and then hid to see what he would do. That day he looked into his right boot, and, seeing that all right, picked up the left boot and put it on. His expression when his foot struck the molasses, and his imagination began to work on what I had done, was worth \$502,000.

The heaviest weather I ever dove in was right in Newport Harbor. A storm came up and carried away two of the moorings of the officers' testing barge, and she was in grave danger of carrying away the rest of them and going on the beach.

I recovered the moorings, but when we started back to the station the seas were so bad that I had three men stand in front of me to break them so that I could stand at the tiller and steer the boat. At that, it wasn't very long before I was soaked to the skin and pretty cold — for it was in the fall of the year.

## CHAPTER V

### BENDS, SHARKS, AND LOBSTERS

PERHAPS one reason why I have had success as a diver is in my physical make-up. I have never had the 'bends,' for instance, though I have probably taken more dives with less decompression than any other man.

The doctors who are studying the causes, effects, and prevention of 'bends' have been interested in my case for that reason. They have said that something in the way I am built, something in the way my veins are constructed, has made it easy for me to throw off the gas very quickly.

'Bends' is not really a disease; it is the symptom of a condition. Air, when it is pure and dry, contains about seventy-nine per cent of nitrogen and twenty-one per cent of oxygen. The nitrogen doesn't help in breathing, but it is in everything, including all our bodies.

When we breathe, nitrogen is taken up by the blood in solution. Under extra pressure of air, as in diving — or working in caissons — more nitrogen will be taken up by the blood, and by the tissues from the blood. There is a 'saturation point' for any given pressure, the point at which no more nitrogen can be absorbed.

Now, if you take off the pressure, the nitrogen is liberated from the tissues and from the blood. Like any gas, it forms bubbles, just as bubbles form when you take the pressure off a soda-water bottle by uncapping it.

That's what happens in a diver's body when the pressure is taken off him — that is, when he comes up. The bubbles don't form so fast as in soda water; they may take some hours to get big enough to cause pain.

That's one trouble with the 'bends.' The symptoms come so slowly that to a man who hasn't had the 'bends,' it seems as if taking decompression is about the most foolish thing he can do. But if he has ever had the 'bends,' he understands that it may be hours before he feels any bad trouble.

'Bends' means atrocious pain. Some men get deaf and dizzy; some are taken with nausea; some are knocked out. But in thirty-five hundred cases that were studied, only twenty men died of what the doctors call 'caisson disease.'

On the salvaging of the S-51, every diver on the job excepting me had the 'bends' — and I put in more time, by far, on the bottom than any other man.

Fat men are more liable to trouble than any others, and the doctors say that it is because nitrogen is five times as soluble in fat as in other tissues, and also it is given off more slowly from fat. This is so well known that really fat men are disqualified by their fat from being even trained for diving.

Divers have to be men of high physical qualifications, anyway; they must be husky, must have at least normal blood vessels, and nothing the matter with ears, heart, lungs, or kidneys. The Navy likes 'em young, wiry, and of a size that will fit the diving suits; between five feet six and six feet.

They have found that it takes about as long for a man

to 'desaturate' or come back to normal as it took for him to 'saturate' under pressure. That is, if it took him four hours to saturate, he must allow at least four hours to be sure he is desaturated. This is one reason for limiting a diver's time on the bottom at great depths.

So they have worked out 'decompression tables,' which show how long a man coming from great depth must remain under moderate compression before it is safe for him to come to the surface. The tables have been tested and found safe. Following them will not always prevent a slight or moderate attack of the 'bends,' but a diver decompressed according to them will never have a serious case.

This is how it works out. You are going to take a dip. The officer or gunner in charge of the diving boat has a watch and a log-blank. He writes down the minute when you go over the side; the minute when you start your descent, and the minute you strike the bottom.

You do your work, and either you tell them you are ready to come up or they notify you to come up, for whatever reason. You get back to the descending line and notify the topside that you are ready.

They signal you to come up, and you take a wrap of your leg round the descending line, and shut off your exhaust valve. This makes you buoyant; you don't have to climb the line, but just let yourself slip up it, checking yourself from going too fast by opening your exhaust valve or shutting down on your supply, or both. Of course, as you go up the air in your suit expands, because the water pressure lessens.



If you are working from an equipped diving boat, you will have a 'stage' at your service. Otherwise, they will send you down a bucket, shackled to the descending line. You simply sit on top of the bucket, with the bucket-rope between your legs, and let them put you at the proper level to take your decompression.

The stage is a flat iron grating held by an overhead croquet hoop, so to speak, of iron rods. It is usually shackled to the descending line and lowered to the first decompression level for you.

As you come sliding up the descending line, one hand on your exhaust valve and the other on your control valve, you presently see the stage overhead through your top-light. You check your rise and climb aboard of it. As soon as you are there, you report to the topside, 'On the stage.'

They will keep you there at that depth the proper number of minutes according to the decompression tables. You can do anything you like; usually, since it helps to work out the nitrogen if you exercise, I do shadow boxing. When two divers are waiting together, they can have quite a bout.

When you have been there the proper number of minutes, they will hoist you to the next stage. Very often, if there is a good deal of work going on, the first thing they will tell you to do when you report on the stage is to unshackle the stage from the descending line. You pull the toggle pin out only enough to let the line out, and then put it back. Then, if they want to, they can swing the boom from which your stage is hanging off to one side, out of the way of other divers. The descending



line is left free, too, for other divers to come up or go down.

Ashore, and on the best-equipped diving vessels, there are 'recompression chambers,' airtight compartments where pressure can be put on. A diver, who because of any emergency has had to be rushed to the surface without taking his proper decompression, is rushed at once to the recompression chamber and at once put under the pressure at which he should have been held. His pains and symptoms go away, and he can take the regular decompression there. Some men, who get the 'bends' in spite of having been decompressed, are also recompressed in the chamber.

Funny things sometimes happen while a man is waiting on the stage, under water. This one didn't happen to me, for I was not on that job, but it might well have.

A diver was working on the S-5, which had been sunk forty-five miles off Cape May, New Jersey, and an incident happened that has probably never occurred before or since.

The S-5 was sunk in a hundred and fifty-six feet of water. This diver was just coming up from his dip, and had reached the stage at fifty feet from the surface. He left the descending line and climbed aboard the stage, where he was due to stay for the next twenty minutes.

He was sitting on the stage with his feet hanging off, as any one might sit in a swing, when something struck his right diving shoe. He didn't pay much attention to it for an instant, for he thought it was the descending line, which was somewhere close by.

Suddenly he remembered that the descending line

was on his left side. He leaned over to survey the depths below, and as he did so got a glimpse of an enormous fish-tail going by just below his feet.

This fish-tail happened to be the propelling mechanism of a huge shark. The diver jumped to his feet, and, hanging onto the stage strap with one hand, got out his diver's knife with the other.

He tried the cutting edge with his thumb, and he said afterward that he would have sworn under oath that it was the dullest knife he ever had carried. However, he judged that it would at least tickle the shark's ribs.

The shark made a turn to his left, and made three complete circles around the diver. Apparently he was trying to figure where he would start in at. Occasionally he would stop and stare at the man with his small eyes. His mouth would open and close — which is characteristic of a fish breathing — and the diver said this opening and closing of his mouth was exactly like the villain's laugh in the movies.

Maybe the shark didn't see any place that looked feasible to start in at; anyway, he started to ascend, with two medium-sized pilot fish swinging along by his side, till he came to the ship's bottom.

Here the shark stopped and took a few mouthfuls of a green mass that appeared to be streaming down from the ship's bottom. The diver told the topside what he had seen, and added that the shark ought to be near the surface or on it. They got out a rifle; it wasn't long before the shark came to the surface, and they made a direct hit on what proved to be quite a large shark.

Divers see a great many fish, of course, while they are

below. In fact, they are sometimes nuisances. At one time I was working on a marine railway here at Newport. We were wrecking it, and my job was to make the slings fast round the timbers.

The timbers were coated thick with mussels, and of course the wire slings crushed the mussels by the thousands. It was like scattering chum-bait in the water, and the cunners, or chubsters, were as thick as mosquitoes round me. Every time I put my hand out, I would hit dozens of them. They kept bumping against every part of me.

There came times when there was nothing for me to do for a few minutes. Then I would sit down on a timber, crush a handful of mussels with my hammer, and hold them out to the fish. They would eat them from my hand just like pigeons, and if I didn't keep up the supply they would peck at my fingers to tell me to get busy again.

Sometimes on the station here, when there isn't much doing, we will give men taking instructions a spear, and let them go fishing. They get flatfish, flounders, aplenty. It takes their minds off themselves, and gives them something interesting to do.

I have caught lots of fish, and a good many lobsters, on the bottom. You find the lobsters round the rocks, and tease them up with the spear. You make little jabs at them without touching them until they get good and goaty. Then you keep up the teasing just a little farther away from them each time. They will spar and grab at the spear just like boxers, but you can tease them out from behind the rock and then grab them. I have

brought up as many as seven at a time, holding them by the tails in a bunch.

One lobster I caught was a famous big one — so big that a store offered me twenty-five dollars for him. He was the biggest lobster I ever saw. I was hunting for a torpedo and making a circle. All at once, as I was fetching my distance line along in little twitches, I felt something twitch back. I tried it again, and it twitched again.

I thought it might be that the line had hung up between the blades of the propellers on the torpedo I was hunting for, so I began to follow it up. And the first thing I saw was two immense claws clutching the line.

I got back of the lobster and put my hand down on his back. But he was so big I couldn't span him with one hand. So I passed my hand forward to the narrowest part of him and then pressed him down hard until I could get hold of his claws together and hold them so.

Then I took him in my arms just like a baby, holding his claws tight, dropped everything, and signaled to come up. You ought to have seen the tenders when I flopped that lobster over the rail into the boat.

I don't know how much that lobster weighed. But I held him up by the tail, and to lift his claws clear of the deck I had to bend my arm. He was very nearly three feet long.

This hunting for torpedoes gives the divers a lot of work, though not so much as it used to do. The torpedo station is here, and so is the torpedo range, and they are constantly at firing practice. Sometimes the torpedo goes wrong; sometimes it shoots off to the left or right;



sometimes, instead of floating as it should do at the end of its run, it sinks for one reason or another. It is likely to sink before it stops running altogether, and to plunge into the mud on a slant. If it still has power, it will go its own length or more into the mud.

You can see how much work there is in hunting for these torpedoes. In the old days they were worth from forty-five hundred to five thousand dollars; nowadays they cost as much as ten thousand to eleven thousand dollars. So they have to be saved if possible.

In one year I alone recovered on the range one hundred and eighty-six torpedoes. Of course this doesn't mean that for every torpedo fired a diver has to be sent down. Most of them float, and the modern ones float better than the older ones.

Those floated level. In the newer ones, the head fills with water just as in the older ones. But the new ones have a device that expels the water from the torpedo head at the end of the run. This, of course, adds buoyancy, and also, by destroying the balance, makes the torpedo up-end, and stand up with its nose out of water.

The torpedoes are so arranged that they have a considerable amount of pressure still left in their air flasks at the end of the run. One day I found the torpedo I was hunting for standing on the bottom on end. I had to climb up on it to make the strap fast for hoisting. The thing was thoroughly greased, of course, and, as I was working up it, my foot hit the starting lever and we were off for the surface.

Of course, if I let go the torpedo would go up, and as the propellers reached me they would rip me open all

the way to my breastplate. So I hung on with my arms round it, slipping back toward the propellers all the time, and managed to stay with it till I came to the surface. Then it floated, and I was safe.

When you have to go down into the mud for a torpedo, you wash it clear of its bed with a stream of hose water. But the first job is to find it. Only experience can help you here.

If you can find the little lumps of mud kicked out by the propellers, and know how to look for direction, it is easy enough. I always ask first, 'How did she go? Did she throw mud?' If they say she did, I know she is buried out of sight. If you can find the lumps of mud, you know the rows of them will run together till you come to where the torpedo is buried. The first question, when you find the little lumps of mud on the bottom is — which way?

Well, if the first ones you see are as large as your thumbnail, and then you begin to find them as large as two fingers, you know you're going right, and you can simply follow the row along until you come to a big hump in the mud. That is over your torpedo.

Sometimes the propellers will just be in sight. Then you call for a torpedo line and make it fast on the afterbody. Then you go up and make arrangements for hosing the torpedo out of its hole.

One torpedo I salvaged was twenty-two feet down in the mud, according to the mark on my life line when I finally finished the job. It had gone down on a slant, and I unwisely undertook to enlarge the hole round it rather than wash away the immense amount of silt over

it. I did this, of course, to shorten my job, but it came near shortening my life.

I worked well down on the torpedo, hosing round it, and all of a sudden the mud caved in on me. The pressure was immediately very great, much greater than water.

I kept my head, for I realized that I had the means of my own salvation in my hand — the hose. I was pressed down into as little space as possible, but I found I could bring the nozzle up close to my helmet alongside my escape valve. I knew I must get and keep that clear of mud, or the air would build up in my suit.

Then I worked the nozzle slowly back and forth in front of me, cutting away at the mud overhead to give myself every chance. It was long and slow, but I finally cut through to the open water, and back along my lines.

They knew on the topside that something was wrong, of course. But they didn't haul me, luckily for me; the line and the hose wouldn't have stood the strain they would have had to put on me, to say nothing of the chance that they would probably have hauled me apart. They signaled to ask if I were all right, of course, but with my line buried in the mud I couldn't feel their signal. I didn't signal to be hauled up either, you bet.

As soon as I was clear, I went to work again, and this time didn't try to make any short cuts, but hosed the whole thing out. I finished that job the long way.

One torpedo I got here in one hundred and thirty-eight feet of water. Gunner Stillson went out in the

boat with me that time to take charge, but when he saw that I was going to dive 'on the pump,' the hand pump, instead of from flasks, he told me I was taking a chance.

'Do you know what that pump's good for?' he asked me.

I said, 'I'll back my pump. I've always kept it in first-class shape, and I think a good deal of that pump.'

'Well, you wouldn't go sixty feet down, with that pump, in the fleet,' said the gunner.

When I got down, he kept 'oneing' — sending the signal of one pull on the line to ask if I were all right, and I answered always, 'Yes.' But as a matter of fact, I had begun to feel uncomfortable. When I started to take a breath, my nostrils would close right up tight, and not until I ought to have got my full inhalation would they open again. The intervals were getting shorter each time, too, when I could breathe, and they finally pulled me up.

I told them I was not getting enough air, and Stillson said of course I wasn't; that pump couldn't hand me enough air. But I tried it again, and I got the torpedo that time.

They told me afterwards that all the time I was down the gunner was pacing the deck like a madman, and cursing himself for letting me go down.

It is the unforeseeable, of course, that gets you. One time the torpedo boat Morris caught a cable in her screw. They brought her alongside the dock, and I went down to see what could be done. I got out all the cable



there was above the hub of the propeller, but I couldn't get out what was between the propeller and the shaft. So I went up again and got me a chisel.

When I came down again, I landed astraddle of the cone that protects the holding-on nut. I intended to lie down between the blades of the propeller and work down on the jammed cable. So as I sat on the cone, I was facing the blades — and all of a sudden the screw began to turn.

I threw my arms wide apart and threw myself backward. Luckily the kick was forward, and the water washed me away from the screw instead of sucking me in. Naturally, the kick would be forward, since she was going ahead when she picked up the cable, and was stopped, still going ahead, when she couldn't do any more.

As soon as I was clear, I grabbed my air valve to prevent being squeezed, and dropped to the bottom. Then I signaled to come up, and when I got on deck, what I told them!

Then I made them put on the jacking gear. With that, the propellers couldn't turn; even if they gave her a full head of steam, it would only strip the machine complete. After that I always made them put on the jacking gear before I would work round a propeller.

We found out that what had happened was that there was a leak in the by-pass of the main steam, and nobody knew about it. The steam kept leaking through and had built up quite a pressure without anybody's realizing it.

So when I got out that much of the cable that was over the hub, I weakened the jam enough so that finally

the pressure of the steam could overcome it and turn the engine over.

When I got back down there again, I found that the engine had kicked most of the rest of the jam out. There were just a few straggly ends for me to clear out, and she was free. But it was only my luck that I wasn't killed that time.

I worked on the yacht *Vanitie* when she was at Newport for elimination races with the *Resolute*, to see which one should race the *Shamrock*. She was a center-board sloop, and something had jammed her center-board so that it could neither be raised nor lowered.

I was sent for, and went under her to find out what was the matter. I never saw such a mess. She had been picking up the lines of lobster pots until her center-board well was jammed with them. They had all brought the pots along, and she was towing a terrible string of them. I don't see how she could have sailed very well, and I certainly don't see that the test against the *Resolute* was a fair one. It was a hard job getting those jammed lines out, but I managed it after awhile.

I have had quite a few other jobs on yachts, but most of them were cases of fouled propellers. When this happened and the yacht could be got into Newport Harbor, they always sent right over to the station for a diver's help.

## CHAPTER VI

### THE FINANCIAL SIDE

I HAVE sometimes been asked about the pay a diver gets. Well, that is a sliding scale, with a long slide, so to speak. A seaman's pay, when I was taking the instruction, was \$21.40 a month; now it is something like \$33 a month. A man can't get any diving money until he has finished the course and has been assigned to some vessel or station. Then he is eligible for diving pay, which when I began diving was \$1.20 an hour. His pay was figured from the moment his face-plate was closed for the dip until it was opened again when he came up. This was in addition to his regular pay. A civilian diver's pay was \$3.04 a day.

During the war civilians' pay rose to \$15.76 a day. It is now about \$14.88, and overtime. A rule on searching for torpedoes has been adopted which allows five hours for finding each one. If you find it in one hour, you get five hours' pay, but if you need six hours, you draw six hours' pay. It is a good rule, for it is to the advantage of the Government to have the torpedo found as quickly as possible, to clear the range, and of course it is to the diver's advantage to find it as quickly as he can. The rule removes any temptation to use up more time than one needs for the purpose of getting more money.

There is a bill now before Congress which provides five dollars an hour for diving in water more than ninety feet deep. But it has not yet passed.

Commercial divers get all sorts of money. Those on the S-51 job claimed they got \$56.40 an hour. This sounds like a large amount, but it must be remembered that a diver can work only one hour a day; and for that matter that the hour is nearer three hours from the time the man begins to get ready for his dip until he is back in his clothes again.

On the S-51 job I put in three months of work, and received a total pay of \$1300. Trying to get together enough divers for that job, the Navy appealed to the commercial divers; the best they could offer was the loan of four divers for one day — or one diver for four days — for \$1300.

Speaking of pay, I have had two interesting experiences with the commercial divers. The first was on a job for the Blue Line. Their tug Salutation had picked up a line in her propeller and had been towed in here to Newport and docked.

They sent over to the torpedo station to ask for help, and I was sent over with some of the class I was instructing in diving. I cleared the mess up and reported back to the station, not having received anything from the master of the tug nor his company. When I reported, the executive asked how long I had been gone on the work.

‘Two hours,’ I told him.

And I was docked, and Jake Anderson was docked, two hours’ pay!

The other story was different. A man in a New Jersey car drove up to my house one night and asked me whether I could go on a job of blowing up a wreck off



Point Judith. I was in the Navy, and of course could go only by getting leave. So I told him I hadn't any gear, but that if he would come over to the station next day, I would see whether I could arrange to get the Navy's gear.

The situation was that the army engineers had required the owners of the wrecked coal barge — she had 3700 tons of coal in her — to remove her, as she was an obstacle to navigation. The contract for removing her had been let to this New Jersey man, with a time limit.

He said he would be glad to pay the Government whatever it demanded for the use of the boat and gear, and I was able to arrange it. On his first visit he offered me a hundred dollars to plant six tons of dynamite in the barge. On his second call, he said if I would do it within five days he would pay two hundred dollars.

I told him I could plant the dynamite aboard in one day, and he said, 'You haven't seen the place yet. It's an awful hole, and one commercial diver has already quit on me.'

We took our boat and gear and went down. She was a three-masted barge with her mastheads just sticking out of water. I told him I could place the dynamite in one day all right, and we made my boat fast at the foremast.

He said there was a hatch four feet forward of the foremast where he wanted two tons put. This fore-castle contained the heavy machinery and anchor hoisting engine, and he wanted to be sure to destroy it.

I went down and found the hatch, all right, but it was a hatch into the hold, so I went farther forward and

found the place the dynamite really should go. I signaled for the boxes, but, instead of sending them down, they signaled me to come up. I tried two or three times, but I finally had to come to the topside to convince him that I knew what I was doing.

It might be well to explain how such a job is done, as people might think that handling six tons of anything in one day is some job. Well, it is, but it is not so heavy as it sounds.

The dynamite, of course, is in sticks, and is packed fifty pounds in a box. To send it down, they lift one slat in the box and pass a becket round it, and then nail it down again. Then they pass the becket round the diver's descending line, and let go; the box slides right down the line to the bottom where he is waiting for it. It will sink all right. All he has to do then is to cut the becket and shove the box to where he wants it. To handle a ton means only shoving forty boxes to the right place.

I put those two tons where they would do the most damage. When I called for it, they sent me down one box that had a stick in the middle of the top layer with a detonator in it. This detonator is a copper tube about as thick as a lead pencil, closed at one end and containing fulminate of mercury, a violent explosive. Two wires are laid into the tube, with six inches or more sticking out, and are sealed in there. When the dynamite is to be fired, these wires are connected to the poles of a battery; the switch is closed, the electric current passes a spark to the fulminate, which explodes and sets off the stick of dynamite. That explosion sets off the

whole box, and that boxful will set off any other boxes in the neighborhood. It is figured that it will set off another box seven feet away. But to make sure, I had the boxes not more than four feet apart, and, in addition to that, I put fused boxes along the line.

I piled boxes round the masts; I made them snuggle up to the heavy machinery. On the deck I strung them along each side and made cross-lines of them. As I worked aft, of course, I was getting farther and farther from my boat — and of course all this took time. So when it came to the after house and the stern generally, I couldn't reach them.

I came up, and wanted to shift my boat aft. But there was bad weather coming, and the contractor insisted that we ought to run for shelter. He dropped his remaining boxes himself into the water over the stern, and took a chance that they would land all right. Then we connected up the fuse wires and fired the blast.

I had told him I was going back to Newport, but it blew so hard that I was mighty glad to take shelter under Point Judith. Next day we were back to the wreck, with an army engineer inspector who had to give his O K before the contractor could collect.

That barge was completely shattered, except a big piece of the stern. Her coal lay out on the bottom in rows like a planted field, and there was hardly anything at all to be seen of the vessel.

I went down on the stern after the inspector had caught it on a grapnel and had refused to pass the job. I found the dynamite sticks scattered all over the place like stovewood, and I gathered up an armful of them

and put them in the stern to help out the contractor's next blast.

He was sore, because he didn't have enough dynamite left to do the job properly and had to get more. The Dupont people were the nearest source of supply, and they shipped only twice a week. But there was nothing to it; he had to wait. Then I blew the stern up.

He told me he made \$2500 on the job as it was, and if it hadn't been for the delay caused by the commercial divers' inability to do the job he would have made \$6000. And he was so pleased with the way I had handled the work that he made me a proposition to join him in wrecking work as soon as I got out of the Navy. He offered to supply the capital and gear and get the business, and then to split fifty-fifty with me. He said we could make a lot of money. Finally he gave me \$385 instead of the \$200 he had promised. As it happened, his offer had a bearing on my own fortunes, though I haven't even yet accepted it.

In 1916, they were organizing the fleet reserve, and doing all they could to get former Navy men to enlist in that service. There were all sorts of offers, beginning with one that, at the end of twenty years, counting the enlisted time and the reserve time, pay for one full cruise would be given as a gratuity. That law had been done away with before I got in, however. Then they offered to make a man's service continuous and to keep his rating intact.

By this time I was a chief gunner's mate. I went back into the reserve, but continued to work as a civilian



diver at \$5.04 a day. I was instructing classes in diving and was getting plenty of work beside, finding torpedoes on the range and doing the station diving work. I enrolled in the fleet reserve December 16, 1916. In the spring, shortly after war was declared, I got an offer from the Inter-Ocean Submarine Engineering Company at thirty-five dollars a week when I wasn't diving and fifteen dollars a day when I was engaged in diving, with an additional bonus to be decided on. I was at the time receiving \$5.04 a day, which was in those days considered good money.

I was called up by the executive officer, and he asked if I were going to take this job. He added, 'You know the Government can call you back into active service if you leave us, and if it does it will be at quite a reduction in pay.'

I told him I would stay. He wrote to the Navy Department, and handed me the Department's answer, a promise that so long as I stuck to my job on the station I would not be called back into active service.

Later on, wages increased to such an extent that a diver's pay became \$14.58 a day, with pay for overtime. There was a good deal of overtime.

Much of this came from searching for torpedoes. The destroyers would come to the station to get their torpedoes, and a lot of them would be taken out on the testing barge and fired. If they behaved properly, ran true, and stayed afloat at the end of their run, the torpedo retriever boats picked them up and towed them back to the testing barge, which hoisted them aboard and then delivered them to the destroyers. But some of

the torpedoes sank, and then the diver had to go after them.

My orders were to clear the range every day. Sometimes I would ask permission to go hunting for them while the firing was still going on. One day there were six torpedoes to be searched for, and the officer commanding would not let me start until the testing barge had finished — at 7.20 P.M.

I got them all, made my thirty-eight minutes' run back to the station, and caught the 9.40 ferry for Newport. But with my overtime the day's bill ran up to almost twenty dollars.

We had a new executive officer on the station, and he decided that the Government could call me back, and get the same work done for far less money. He succeeded — and there is one case where the war did some one 'good.'

I was called back for fifty-nine dollars a month. I requested to be sent to sea, but was told that I was of more service to the Government where I was than anywhere else, so I was kept on the job.

There was plenty of work. Instruction in diving went on steadily, with large classes — too large classes — and this alone kept me so busy that I had to use the noon hour between classes to do the torpedo-searching. It might be explained that when I found the torpedo, I put a 'torpedo recovery strap' round it, hauled it to the surface with my boat, towed it clear of the range and back to the testing barge, where it was hoisted aboard.

At one time I worked forty-seven days straight, Sundays and all, never quitting until after six o'clock,

and working as late as eleven on more than one occasion.

During the war, of course, I got some ticklish jobs with torpedoes that had war heads all armed, and with contact mines. One of these mines they were experimenting with, and they had anchored it off the Dumpings, here in Newport Bay.

It was a globular mine, and could be exploded either on contact or by electricity from the firing boat. It was anchored by an ingenious device that made it anchor itself at a given depth below the surface, no matter how deep the water was below it.

When they tried to fire it, they failed. It didn't go off, and they sent for me to recover it. Of course, the current had the mine to leeward, so to speak, of its anchor. I anchored my boat considerably to the leeward of that, and came up to the mine with plenty of slack in my lines. I bent my line onto the anchor, very gingerly, so that no strain would come on the mine and tilt it when they came to hoist away, for tilting it meant getting a contact and blowing it.

They decided after that that it was too risky a thing to do — for, of course, there still lay ahead of the experimenters the even more ticklish task of hoisting it aboard again without touching it in a vital spot! And they abandoned that kind of test.

On another occasion, when the Vesuvius was on patrol duty outside and rolling in a seaway, one of her torpedoes, with a war head on, got away. I think the stop must have been up and the send of the sea simply dumped it out of the tube.

The torpedo's engine began to turn over, and away

she went with her rudder hard over. Now those torpedoes are so fixed that until they actually start their run you could hit the war nose with a hammer and do no harm. But as she runs, a little propeller-shaped fan runs up a screw thread and finally runs off and releases the mechanism so that the nose is sensitive. This happens when the torpedo has gone about one hundred and fifty yards; after that, watch out!

The torpedo's rudder being set, the thing tore off in a wide circle and then swung back again toward the Vesuvius. They had seen it, and they did some mighty lively maneuvering to keep out of its way, and still to keep so they could watch it and recover it at the end of its run. For at the end of its run an unsuccessful war shot will sink.

The Vesuvius got to the torpedo smartly, and got a line on it and towed it into the harbor near the dock, where, of course, it sank gently on the bottom. I was sent for to recover it.

I went down and found it all right. What I had to do next was simple enough. It was simply to screw that war head back until it was in an 'unarmed' or safety position. Well, it is simple, on the surface, in a good light, to uncock a loaded pistol — yet accidents have happened even in that operation. So it seemed to me a very gingerish job to take hold of that war head and screw it backwards gently, steadily, and with no pressure.

Some years ago, the life line and hose were not sewed together the way they are now. Twice I have found



myself in a bad scrape on account of this — and of inefficient tending. Both times were in Newport Harbor.

Each time the trouble was that the tender had given me too much slack. I was searching for something, and my life line got round the edge of a rock. I didn't notice, and as the line rendered along, didn't become aware of what had happened. But presently the air hose also got caught on another rock, some distance from the first.

The pull on the hose caused a defective piece of it to blow out, and of course I got no more air. At the same time my tenders noticed the bubbles rising far away from where I was and realized that the hose had burst. They pulled on both hose and life line, and there they had me. I couldn't move either way.

Well, I shut my exhaust valve, got my knife out, and cut my air hose off. Then I could get a little slack on my life line, and signaled to come up — 'emergency.'

The other time, it was much the same, though the hose didn't burst. But that time they let up for an instant, and I got a little slack, and got the hose clear of one rock. Then I could follow the line up to the other rock and clear myself.

Once I was searching for a torpedo on the range. The flag was up on my boat, but the testing barge fired another practice torpedo. My tenders saw it coming, and saw that it was likely either to hit their boat or to pass between me and the boat. They didn't dare to haul me, for fear of hauling me right into the torpedo's path, and that was good judgment. The torpedo did pass

between me and the boat and I could hear it plainly. It was very near me. I reported that one, and an officer got a terrible lacing for the incident.

One of those testing jobs had a funny finish, with a desperate few moments that caused a flock of goats to part their moorings. Pretty nearly everybody present lost his goat.

It was in the Brooklyn Navy Yard, and they were testing out an under-water torch of a new design which had been brought there by a salesman. The test was being made by a diver in a tank filled with water. It was arranged so that air pressure could be put on top of the water to make it similar to any depth desired.

Somehow or other, the torch blew up. The diver wasn't in any danger, but the man tending his lines got excited and yanked the torch out of the water. This started a flame of nitrogen and oxygen and scared the tender some more.

He gave the torch a heave and it landed on an officer's shoulder. The officer started to run, forgetting that he had on ear-phones which were connected to the tank, and from there to the diver.

The officer fell when he was fetched up by his ear-phone wires. He pushed the phones off, grabbed the torch again, and started again on the run to get clear of the nitrogen and oxygen tanks near by. This time he fetched up against the hose attached to the top of the tanks, and fell again, burning his hands on the hot rubber as it slid through them.

The salesman started to run and fell into a flat car.

The shop foreman ran, and fell over the nitrogen bottles. In the meantime the yard workmen had shut off the nitrogen and oxygen bottles, and there was no damage except to the salesman's torch and the dignity of all hands. The thing might have been very serious, but it looked very comical, the climax being when the diver telephoned from the bottom of the tank, 'Where the hell's my torch?'

At the end of the war, when everybody else was getting out, I voluntarily stayed till my enlistment expired. I had gone in as a first-class gunner's mate, and it was suggested to me that I could get a rating as chief gunner's mate.

Now it happened that I had a pal, and that when I had enrolled in the fleet reserve I made the same stipulation for him that I made for myself — that we should not be called back. But we were called, as I have told. So now, when they offered me the new rating, I asked for it for him also. It was promised; I stayed in and passed for the new rating, though I really did not have the knowledge required.

Two months before my time was up, I was sent to the *Dixie*, the tender for the destroyer fleet, as chief gunner's mate. The gunner was a good fellow, and what I had to do any man who used his head at all could do, so I got by. The time was passed at Philadelphia and there was no diving to do.

I got my discharge on the *Dixie* on December 15, 1920, and came back to Newport, expecting to get back my job as civilian diver. I was promptly told that there

wasn't money enough available for the station to hire a civilian diver. But the executive said he would hire me as a rigger and diver, and I took the job at six dollars and something instead of fourteen and something.

During this time about the only diving I did was on jobs that somebody else couldn't do.

There was a derrick, for instance, that had sunk alongside the training station. Five divers had worked on raising it for six weeks. That wasn't so bad. But they would put in a day, and then say, 'We'll be ready to pump her out on Tuesday.' Well, they intended to use an oil barge's pumps to unwater her, so the fellow in charge would say, 'Shall I get the barge down Tuesday?' and they'd tell him yes.

The barge had to come down from Melville. Down she'd come, but the divers would say, 'We won't be ready till Friday.' On Friday they'd be ready Monday, and I suppose the fellow was getting a lacing from his superiors for getting the barge down so many times. Finally I was sent to see what could be done.

I found that sometime the derrick had taken too heavy a lift, and the strain coming on her stern had pulled it right open. The divers had tried to close the place with canvas, but they had simply stretched the canvas across the opening. So I said I would like to put some battens across first, and support the canvas.

The officer in charge said, 'The only way you'll ever get that derrick out of there is with dynamite.' But I persuaded them to let me pull off the work that was on, and put on a patch my own way.

I stripped off what was on, put the battens across, and



then crossed them with others. Then I could fit the canvas, batten that down, and cover the hole so that it would stay covered when the pressure came on it.

We had to build a caisson dam round the forward hatch, of course, and then I sent for the pumps. In twenty minutes from the time they began pumping we were standing on her deck, and in an hour we could get into her hold.

It is astonishing sometimes how water-tight canvas patches will stay under water. Once a torpedo went through my boat on the range — it had no war head on it, of course.

The men with me bailed for dear life, and I did what I could to stop the hole while we ran for the beach. When she took the ground, I had a piece of luck, for she heeled so that the side with the hole in it was up.

I put on a canvas patch, and we went back to work. Furthermore, she ran on that canvas patch for weeks before I got a chance to have her properly repaired.

Another of those 'fix-it' jobs was a pipe-laying proposition. The water main that supplies the station comes across the harbor from Newport, and it had sprung a leak. The authorities decided that the cheapest way to fix it would be by using pipe-fitters on a barge rather than divers. They were justified by the estimate given them by the pipe-fitters, who said the job could be done in seven hours.

The pipe was in twenty-foot sections, and some of it had been on the bottom for eighteen years. It was found that there were really only two bad pieces, and

they happened to lie with one good piece between them. So there were only forty feet of pipe to replace.

But when they lifted the disconnected pipe to the barge, of course that made an angle in the line, and it would break. Then they'd go to the break and lift, and another piece would let go. They worked six weeks, as carefully as they could, but the only result was that they had two hundred and sixty feet of pipe on deck.

The work was simple enough for divers. I took another man, and we laid eighty feet a day, and finished the job in four days.

When I reported it all connected up, the executive said to his yeoman, 'Telephone to the power-house and tell them to put on a hundred and twenty pounds pressure on the new main and hold it there for twenty-four hours.'

Well, the pipe was never tested to more than eighty pounds, so I thought, 'Gee! There goes the old job again.'

I couldn't sleep that night for wondering if it was holding up. I had made a mild protest to the engineer at the power-house, but all I got was, 'Orders is orders.'

When I went to the island in the morning, I watched for bubbles along the line of the pipe, but didn't see any. You know when a pressure test is applied, they use air and not water, for the air will show up the leak. And when I protested, it was not for fear of my work not standing up, but for fear that some of the eighteen-year-old pipe would let go. However, it held.

Work became scarce in the rigging line on the station,

and it became necessary to lay off some of the men. As I was the last one hired, I was the first to go. The boss rigger and I were sent for, and the captain told me, 'We haven't got any work. You know it, and I know it, and everybody knows it, and you know I can't justify keeping on everybody. But I hate to let you go. Let's see this man's record.'

He found that previously I had been on as ordnance man and diver, and asked, 'Would you do it again?'

Jobs were hard to get just then, and I said, 'Yes,' and was taken on. From that time on most of my work was in handling explosives. They used me also in test work or experimental work, and were particularly keen on taking me along on jobs where there was any danger. There was more or less diving in it, too.

Some of the jobs were ticklish enough; there is little percentage in recovering, for instance, one of these floating 'contact' mines, where if even your line comes well into touch with one of the prongs you will never worry again. Some of them it won't do even to roll to one side in the water.

There were funny things, too. I remember one occasion when I was sent to get a floating mine that had drifted into Taylor's Point, Conanicut. My job was to take the top plate off and take the detonator out if it was a live detonator.

I went alongside this mine in a small pulling boat, and started to back off the nuts holding down the top plate. About that time the mine started to sizzle, and there were a few anxious moments until I realized that it was only the air pressure built up inside of the mine to make

her float. She turned out to be a test mine, loaded with sand, and with a dummy detonator.

My job as ordnance man and diver lasted till December 15, 1926. Then I reënlisted in the service, having received an offer to make all my service intact, and to allow me a retirement after sixteen years on half pay. My retirement comes in 1932. This was advantageous for me, for under the rules a diver, when he becomes more than forty years old, is reduced from first-class diver to second-class diver automatically, with a corresponding reduction in pay.



## CHAPTER VII

### SALVAGING A SUBMARINE

I WAS still an ordnance man and diver — the work as rigger having fallen off — when the steamship City of Rome hit the submarine S-51 and sank her, about twelve miles east of Block Island — that is to say, about eighteen miles to sea south from Newport. This happened September 25, 1925.

As a civilian employee of the station, I could not be ordered out on the job. As a matter of fact, I was on leave at the time, and didn't get back until October 11, when they had given up all hope of any rescue of the thirty-four men who went down in the submarine. The Rome picked up three men when the crash happened.

The S-51 was on a practice cruise at the time, doing what they call an availability run of twelve hours on the surface; the City of Rome was on her regular course from Savannah to Boston. She came up astern of the submarine, but never saw the red port running light of the sub till it was too late.

The steamship hit the S-51 on her port side and cut right into her. The sub went down within three minutes, and all they could find, when the City of Rome lowered a lifeboat, were three men swimming. All three of them had been in their bunks and asleep when they were hit; they were picked up in their underwear.

It was one of the strange things about the disaster that they should be the only ones saved. At least two



THE DIVERS WHO RAISED THE S-51

Lieutenant-Commander Ellsberg sitting just above the gash in the submarine's hull; Tom Eadie at his left



men must have been on top of the conning tower, and several others must have been awake and on duty.

We divers had many a discussion, later on, about why none of the men who were awake could get clear when men who were asleep did get out. It was suggested that these three had come right out through the gash in the submarine's side when the water rushed in — that they were really washed out. But they said they went up the conning-tower ladder.

One of the three said afterwards that when he was swimming, he saw five heads near him. This would account for the two others who were saved, and perhaps for two bodies which were later found outside the submarine, on the bottom under her rolling chock — and of course those two men might be the men who were on the top of the conning tower when the collision occurred. They could have been caught by the wireless antenna and carried down.

The accident happened at 10.30 at night. By dawn, the destroyer Putnam was rushing down to the bearings the City of Rome gave. The S-50, a sister ship to the 51, was also sent, but Lieutenant Hawkins, flying a sea-plane, was the man who really found the oil slick that told where the wreck was, and led the ships to it.

The divers on duty at the torpedo station came down in the station diving boat Crilley, and by afternoon three of them had got down to the S-51. It was tough diving, for she was in a hundred and thirty feet of water, in the open sea. But they got air hose hooked up to the sub's salvage air lines, so that air could be forced into her compartments.



The divers stamped and banged on her decks, but they got no answering signal to show that men were still alive inside.

Yet, there was a chance that there still was life aboard, and the rescue work went on. Two big derrick lighters, the *Century* and the *Monarch*, were sent for; they could lift, working together, two hundred and seventy tons. The divers had found the submarine's stern clear of the bottom, and as the gash was forward there was a chance that there might be air aft. The two derricks hooked on to slings put under the stern, and together tried to lift one end of the submarine. They couldn't budge her.

By September 30, it was a sure thing that no life was left aboard the S-51. The divers had cut tiny holes through into every compartment and found them all flooded. All there was left to do was to get into her. Three days later, the divers got the engine-room hatch off.

They found three bodies on the engine-room floor, at the foot of the ladder leading down from the hatch. Then they found that the after door of the engine-room, leading to the motor-room, had not been closed.

That told the whole story. The gash cut by the *City of Rome* had been so big, the inrush of water so sudden, that the men didn't even have time to close the doors. All hands had drowned at once when the submarine took her last plunge.

When I got back from my leave, on October 11, I at once volunteered to go out on the S-51 job. It was our first attempt at salvaging a submarine in the open sea;

it was work that called for men experienced in deep diving, and it was the most important job that had ever come within my reach.

The executive officer at the station wirelessly to the officials in charge out at the wreck, and I was accepted. A diver's wife gets to know how risky this or that kind of job is, so when I went home for my clothes it was necessary to tell my wife I had been ordered out to the S-51, and then just go.

Captain Ernest J. King, commander of the submarine base at New London, was in charge of the salvage operations. He knew, probably, more about submarines than anybody else within reach, though he was faced with entirely new problems here. The salvage of a submarine under these circumstances had never been tried before.

Lieutenant-Commander Edward E. Ellsberg, who was a naval constructor, was the engineering expert who handled the details of the work. He was a live wire, and his spirit when we came to our difficulties kept the divers on their toes. He even made dives himself.

On the S-51 job, he like all the rest of us had it all to learn. There was no known technique of placing pontoons, for instance, and what we learned that fall made our work much easier in the spring. In fact, it led to improvements in the pontoons themselves that made a great difference. Ellsberg also invented a torch for cutting metal under water, that was of immense service in salvage work.

Gunner Clarence E. Tibbals was in charge of the divers. He decided whether diving was possible,

whether this or that man could go down, and kept watch to see that they didn't stay down too long.

He is now in the Department's deep-sea diving school in Washington. Commander Ellsberg is out of the Navy and in important engineering work. Captain King has gone along the road of promotion, and is now on duty at Washington.

The situation out there was like this: the S-51 was lying on a bottom of clay, coarse sand, and fine gravel. She was a little by the head, though her keel was clear to just about the anchor recess, some fifteen feet back from the bow — or near enough, anyway, so that we could get a chain under her there without tunneling.

The City of Rome had hit her on the port side and cut right into the battery-room. That is the compartment forward of the central operating compartment, or C.O.C., as it is called. The gash went clear up to the deck itself; it was twelve feet long, and much too big to patch and make tight.

So the proposition was to make the submarine as buoyant as possible, and then to lift her by sinking pontoons in pairs along her sides, chaining them to her, and blowing them — that is, forcing the water out of the pontoons by pumping in compressed air.

The battery-room and the torpedo-room — that is to say, the forward half of the submarine — couldn't be unwatered. The break was in the battery-room, and there was a tangled mess of wreckage jammed against the door to the torpedo-room, so it couldn't be closed. But the control-room — that is, the C.O.C. — the engine-



U.S.S. FALCON, THE SHIP THAT SALVAGED THE S-51 AND THE S-4





room, and the motor-room could all be unwatered and blown full of air, if the necessary work of closing valves and making tight could be done inside the boat. This was the job that was put up to the divers.

Their other job was to dig tunnels with streams of water from fire hose right under the vessel, so that chains could be run under her and attached to the pontoons that were to do the lifting.

We worked from the Falcon, the Navy's salvage vessel, which was put on a set of moorings that held her directly over the S-51. The Vestal, our repair ship, anchored close by, and a couple of big navy tugs acted as tenders.

We also had the S-50, a sister ship to the S-51, which we used for rehearsing the jobs the divers were to do on the 51, even trying the stunt of putting on a diver's breastplate and then seeing if we could get through the doorways on the S-50. We learned the lead of pipes we had to blank off and the location of valves we had to close and open.

There were twenty-one divers who worked on the S-51, though some of them made only one dive apiece, not being able to stand the work or being put out of business one way or another. All of them, I found, were men I had instructed in diving at the station. Two of them, Fred Michels and Bill Carr, were special pals of mine, as they are to-day.

On October 11, I was delayed on the way out to the wreck. The sea had kicked up and we had engine trouble. So I didn't make a dive that night, but the divers held a conference on the Falcon, and the men who

had been down told us what the conditions were on the bottom as they had found them.

We talked that night mostly about tunneling. They had had no success; they were using hose the size of fire hose, with a pressure of about seventy pounds. If you have ever seen a fireman trying to hold a nozzle, you may remember how it tried to kick away from him, and what a wicked, whipping weapon it became if it ever did get away. It was so hard to handle that some of the divers wondered whether compressed air wouldn't be better.

They knew I had had a good deal of experience washing out torpedoes that had buried themselves in the bottom, and I believed in the hydraulic wash for tunneling, but I didn't like to say anything until I had had a look. So next day as early as I could, I went down and started washing away.

I started at the forward tunnel, which was to go through just abaft the anchor recess. The gravel was full of little pebbles, and they would rattle off your helmet like rain on a tin roof. But the going wasn't too bad, and I got through past the keel on this first dive. I stayed down an hour, which was plenty long enough for a depth of one hundred and thirty feet.

There is a trick to the tunneling job. If a man stands facing his work and driving the hole in front of him, the sand and gravel piles up behind him and round him. I got my back against the hull, and started by washing away from it, making a broad, fan-shaped hole. Then I could turn round, face the boat, and cut a hole with the sides up-and-down, as straight and regular as a doorway.

Of course, once in a while I would have to turn round again, put my back to the hull, and fan away with my hose stream the stuff that had piled up.

I started on the worse side of the two, the port side, because the boat had a list that way. After a while I got down to the keel. So I telephoned up and told the top-side I had reached it, and for them to send a man down on the other side of the submarine.

I could hear my telephone tender pass the word. 'Eadie says he's found the keel of her,' he said. Then, in a moment he said, 'Wait a minute, Tom — Commander Ellsberg's coming.'

Ellsberg came on the telephone, and said, 'What's this, Eadie?'

'I've found the keel,' said I.

He didn't believe me, for I had been down only an hour. He said, 'What you've found is the rolling chock.'

'I've found the eighteen-inch box keel,' said I, and he was so tickled that he chucked his cap into the air, and it went overboard.

'All right. I'll send down a man to relieve you,' said he. That was all right, for my time was up and more than up. It is not good to stay too long at a hundred and thirty feet depth. More than that, there was some swell on, and when there is any sea at all the diver pays the penalty. If the swell is only four feet high, every time a wave passes over him a diver gets two pounds more pressure on every square inch of him. It makes some men's heads ache, and is even dangerous to their ear drums. It did not trouble me. But I knew that Ellsberg



was sending the relief man down partly to check up on what I had said.

When I got up to the stage, and was taking my first period of decompression there, eighty feet under water, they told me by telephone that the man who relieved me — I didn't know who he was — had got a line under the keel.

The way this is done is, when you are nearly through, you bend a line onto a long, flexible rod, and shove the rod through the sand and up on the other side. A man there catches it and bends his own line onto the bent-up end of the rod. Then the first man hauls the rod back and bends the two lines together. That way you've got a continuous line from the surface to the surface, passing under the sunken sub.

Sometimes, especially in mud, when you feel that your tunnel is practically through, you can stick your foot out and push it up to the other side through the mud and wiggle it. The other man, feeling round — of course you can't see a thing — feels it wiggling, catches it, and bends his line onto it. Then you pull your foot back and you've got the two lines.

With the line once under, the Falcon's crew make fast to one end of it a heavy manila line, and haul this down, and under, and up. This heavy line can stand the strain of pulling a wire rope down, and a wire rope is the only thing that can haul the heavy chain, with its two-and-a-half-inch links. It's like the fellow who was imprisoned on the tower, and who first ravelled his sock and let the thread down to a friend, and then hauled up a string, and then a cord, and then a rope, and came down on that.



TOM EADIE IN HIS DIVING-SUIT



TALKING WITH A DIVER AT THE BOTTOM



Tunneling is a tough job; it was only because I had had so much experience washing out torpedoes that I got through so quickly. You have to work in all sorts of positions, sometimes half-buried in silt. There is constant danger that your exhaust valve, on the side of your helmet, may clog with silt and stop the release of your used air. If the valve clogs and the air is still coming in through your hose, your suit will inflate till you blow up to the surface, or else the other thing happens — your suit bursts and you are squeezed to death by the enormous water pressure.

As soon as a man starts a tunnel, he is likely to lose his sense of direction completely, and turn at an angle. I have before now followed a man who had started a tunnel under a vessel, and found his tunnel turning almost at right angles, and going along the length of the ship.

There is the danger of cave-ins, though if a man makes his cut properly, this is a minor danger. There is danger, too, if, in order to get a purchase, you deliberately allow yourself to sink into the silt up to your waist. There may come a situation where you can't dig yourself out easily.

The second day when I went down I landed on the deck and saw another diver standing there with a thousand-watt light in his hand. We don't use lights working outside of a submarine, so I naturally looked to see what his situation was.

He had a turn of his hose and life line round a broken stanchion on deck. I went up to him and called his attention by a gesture to the fact that he was foul, but he



motioned to me that he was all right, that he could clear himself.

This didn't take half a minute. But to show you how close tabs they keep on us when we are down, the topside asked me what was the matter, why I didn't go on to my work.

'I've found a man that looks as if he was fouled by a turn in his line,' said I, 'but he says he's all right.'

'All right,' the topside answered, 'go ahead and leave him.'

I was anxious to get at my job. So I walked along the deck of the submarine a little way, and then jumped over the side.

As I landed, it turned very suddenly dark round me. I stood still, and peered about in the gloom till things began to show up as my eyes got accustomed to the lessened light. Then I saw what I took to be a man near me, but he had no hose nor line on him.

'Gee,' I said to myself, 'this man hasn't any diving suit on. Where am I now?'

Then I realized that I had jumped right into the gash in the S-51's side, and was inside the boat. This man I was looking at was one of the crew who was so caught in the wreckage that they hadn't been able to get his body out, though this was October 13 and the wreck happened September 25. We were to have that man for company every time we worked in the S-51, all the rest of that fall till December, and again when we worked from April to July of the next year.

At the moment, though, I was chiefly concerned with my own fix. I thought, 'Gee, this is a pretty tight

place.' But I stood still, and made it my first job to feel carefully round behind me, and find the sharp edges of the gash in the submarine's side. Broken metal can sometimes have an edge so sharp that it will cut right through a suit, to say nothing of having jagged points that can either hang you up or tear the suit.

I got all the dangerous edges located, and the next thing was to make sure my hose and life line were clear. Then I blew myself up out of the hole by shutting my exhaust valve and making myself a little buoyant. Then I went along the deck a little farther, jumped over again, and went to work.

Pretty soon the topside telephoned. I cut down my air supply, for air makes a noise coming into the helmet, and you can't hear very well unless you cut it down.

'Go and get Frenchy L'Heureux,' they were saying; 'he's foul.'

'Who is he?' says I — 'the man with the light?'

'That's the fellow,' says my tender.

'O K,' I said, and looked round.

I could see Frenchy's light some distance away and playing around as if he were moving it back and forth. He still had the turn round the stanchion, but it was rendering and had given him some fifty or sixty feet of slack. He was away from the submarine now, on the bottom.

I went over to him as fast as I could, tapped him on the helmet, and made a gesture to show I would help him. Then I traced his line and hose back to the submarine, climbed aboard, and cleared the turn from the stanchion.

Next I telephoned to the topside: 'O K — pull him up.'

'We can't,' they said.

'Well, he's clear here,' says I. 'Better pull me all the way to the surface, and have Frenchy's line and hose handy so that I can descend on them.' That was the quickest way to find out where else his lines were fouled.

They hauled me, and as I came to the top they brought Frenchy's line and hose over to me; I grabbed them and slid down on them. They led right down to the stage, which was hanging at eighty feet below the surface, and there I found the trouble. The line had two turns round the stage, and this was what prevented the people on the topside from hauling him up.

All this time, of course, Frenchy was standing down there on the bottom, waiting for something more to happen. So I reached down under the edge of the stage and got hold of his line there and hauled him up and onto the stage with me. By this time I was pretty well exhausted myself. I had cut down my air supply to telephone, and I had been doing some pretty heavy hauling.

When Frenchy got on the stage, he took my hand in both of his and gave me a wonderful shake. So I telephoned to the topside again and said, 'He's on the stage, and apparently all right. He's got two turns round the stage, but I think I can take them out.'

When I had rested, I passed L'Heureux twice round the stage and took the turns out of his line. Another man who had been working on the bottom came up on the stage, and we all three took our decompression un-



TALKING BY TELEPHONE WITH THE DIVERS AT WORK ON THE S-51



COMING UP FROM A DIVE





der water instead of going to the top and into the decompression chamber on deck.

I went below when we got aboard, to change my clothes, which had got soaking wet. I asked Frenchy, as I went in, how he had got foul, and he said he didn't know.

Now I changed in a hurry, but before I got completely dressed Frenchy was already beginning to cough. I called to the hospital steward, 'You'd better do something for this man'; but Frenchy was already coughing violently, and he fell off his chair. Before they could get him up the ladder and into the decompression chamber for recompression, he was beginning to turn black. He was in the chamber, under gradually lessening pressure, for sixteen hours, and if it had not been for the expert care of Chief Gunner Tibbals, who was in charge of the divers, and Doctor Flotte, Frenchy would have died.

It was a very bad attack of 'bends' or caisson disease. Everything that could be done at the scene was done, in the way of decompression and recompression. But L'Heureux needed medical care and was shipped to the Naval Hospital at Newport. His case was rather severe, and became one of the recorded cases. They kept a diary on him.

I went over to see him twice while he was in the hospital, but he didn't know me. When he did come round he said it was fifty days that he didn't know where he was or why. He would see men moving about, but what they were doing he hadn't the slightest idea. He didn't even realize that he was in a hospital.

He was released after two months, and was then given sixty days' sick leave. He recovered, but that man will never dive again.

We wanted badly to get into the C.O.C., the central operating compartment. Civilian divers had said it couldn't be done. Navy divers had tried it, but hadn't got in. It happens that I am naturally ambitious; there is nothing that I get more kick out of than seeing another man trying to do something he can't do, and then going at it myself.

We were working through the engine-room hatch, and working in pairs. When you are working inside of a submarine, you have to have another diver to tend you. He stands just outside while you work. There is great danger that a man working in the tangle of machinery inside of a submarine may get hung up; there must be a helper standing by to get him out.

This day I went down ahead of the others. I got to the narrow door between the engine-room and the C.O.C., and turned sideways to edge my breastplate through. But I hung up in the doorway, and had to wiggle, to ease this part and that part by the tight place.

Suddenly I slipped right through, and before I thought I said aloud, 'My God, I'm in!' That was sure a surprise.

The next thing to do was to see if I could get out again. I did get out just as the other man came along. He tried the doorway, and when he stuck in it I pushed him, to help him through. He didn't like it, and telephoned to the topside to tell Eadie to stop pushing him.

So I stopped, and he tried again, and again he stuck, and again I pushed him. Then he waved me away.

We put our helmets together; you can hear that way.

‘Can’t you make it, Jimmy?’ I said.

‘No,’ said he, ‘it’s too tight.’

I called to whoever was tending my telephone to tell Ellsberg that we couldn’t get in. I didn’t want to tell him that Jimmy couldn’t get in, though I had been in myself. So in a minute the topside gave us another job that Ellsberg wanted done, and we did that.

When we got back on the topside, Ellsberg came around. ‘What was the matter?’ he said. ‘Why couldn’t you get in?’

‘The breastplate hung up in the doorway,’ I told him.

When we got down to our quarters, all the divers were talking about the job of getting into the C.O.C. I suggested a way it might be done.

‘Why the hell didn’t you do it yourself instead of telling us, if it’s so simple?’ one guy asked.

‘I would like to try it again,’ said I.

But shortly after that, on the hints I had given, two other men did get in, and got credit for being the first men to enter the C.O.C. That would have been the end of it if a New York ‘World’ reporter, who was aboard one day, hadn’t asked Tibbals who was the first man in.

‘Eadie was,’ said Tibbals.

Ellsberg, who was sitting there, spoke up and said, ‘You’re crazy. Eadie hasn’t been in yet.’

‘I beg to differ with you, sir,’ said Tibbals. ‘Eadie was the first man in, for I happened to have his tele-



phone when he made that dive.' He had heard my exclamation.

Ellsberg came round to where I was getting ready to make a dive. 'Here,' says he, 'you've been laying down on me!'

Well, I was all on edge, just getting ready to go overboard, with every detail I was attending to a matter of life-and-death importance to me.

'What do you mean by that?' I said. The 'sir' business gets forgotten sometimes, out on these salvage jobs.

'You've been in the C.O.C.,' said Ellsberg.

I didn't know how it had got out. So I only said, 'Well, you seem to know all about it.'

'Will you go in again?' he asked.

'Sure — any time.'

'All right,' said Ellsberg. 'Your job's changed.'

I went in that time alone, and Ellsberg kept me in there three hours and twenty-three minutes. It was the longest dive that was made on the S-51 job, and I was eleven hours under pressure altogether.

Ellsberg would tell me what to do, and when I had finished one thing he would say, 'Well, just one thing more before you leave.'

Of course the C.O.C., where everything in the submarine centers, is the most important place. Ellsberg had me opening this valve and closing that one, on the manifolds, so the tanks could be unwatered; finding out conditions, checking up on whether air-banks were open or closed, and filled or empty. I knew where things were, both from my long experience in submarines and from



THE SUNKEN S-51 BEING TOWED TO NEW YORK

*Left to right on conning tower: J. C. Niedermair, civilian draftsman; Lieut. R. K. Kelly; Lieut. Commander E. Ellsberg, Chief Salvage Officer*



rehearsals which we had held on the S-50, so it was pretty easy for him to direct me.

To understand what we had to do on the S-51 job, you should know that the dead weight of the submarine as she lay on the bottom was about 760 tons. We had eight eighty-ton pontoons which would give 640 tons total buoyancy. The control-room, engine-room, and motor-room, when completely unwatered, would add about 400 tons, and the tanks — five or six of the ten main ballast tanks, the after fuel tanks, and some of the small bow tanks, gave 125 tons additional buoyancy. None of the sub's buoyancy, however, was available forward of the bulkhead between the battery-room and the control-room.

We had to do all sorts of tricks. Where the control valves of the tanks could not be reached, we went over the side and burned holes in the lowest part of the tanks with underwater torches. Then a diver would shove an air hose into the hole and displace the water in the tank with air.

For stopping the engine-room and control-room ventilation valves, we poured liquid cement, a quick-hardening cement, down from the topside through a hose.

When we got a compartment ready, all valves closed, we would hook it up to an air line outside and blow it. Sometimes we found leaks. Then we would have to find a way to stop those leaks. For instance, we couldn't close the main engine air-induction valve in the engine-room. It wouldn't seat, and we had finally to rip up the superstructure deck and take off the valve bonnet — a



little toy that was held down by thirty-eight seven-eighths-inch bolts, and was thirty-nine inches in diameter. Try hacking off thirty-eight little bolts a hundred and thirty feet under water, and then wrestling that thirty-nine-inch bonnet off!

In that case, I got another man to hold the valve open, while I fished in under the seat, and found an S-shaped piece of one-inch pipe that had apparently been left in the induction pipe when the ship was built. It was worn to the thinness of a wafer at one end.

The work went on night and day. I made two dives on some days, and on one occasion of emergency I was asked to make the third dive.

We had finished the work in the C.O.C., but not in the motor-room and engine-room, when the bad weather began to get us. The water was getting colder all the time, and on November 30, when there had been nine days in succession on which it was too rough to dive, it was concluded to end the work for the season.

Anybody who has ever gone swimming in the ocean knows that sea-water in our latitude is always cold. There are tropical places, of course, where the sea-water is agreeably warm; it is only in such waters that helmet diving can be done — diving without any suit at all, only the helmet.

In cold water or cold weather — and both of our major submarine jobs have been either in cold water or cold weather — a man going to work under water suffers the tortures of the damned. It is especially hard on the hands, of course, in spite of the gloves.

On the S-51 job they tried to fix up an electric hand-

warmer. It wasn't successful, of course, because it always short-circuited.

The real torture is to go down and then have to stand and not do anything. If you are working, you at least keep your circulation going. But one man has got to stay on deck when one or two others are working inside of a submarine, to tend them — and, believe me, that man is good and cold. He actually must be there, on the deck. There are so many obstructions inside and the lines have to go round so many corners — catching on most of them — that you never could send signals to the topside. You can manage to make the man on deck feel your signals, and he can give you more slack or take up some, and he can tell the topside by signal or telephone to give this diver a little more slack or take up some on the other one.

The cold below is not like surface cold, either. It is a real 'vault cold.' And after you get up, and get into the decompression chamber — which is warmed by an electric heater — almost the worst part comes; the tingling as the cold comes out of you is very painful. Then you get a shot of stimulant. You never get one before you go down; alcohol stimulates the heart too much.

The last job we did on the S-51 in the fall was to uncouple the hose that led into the engine-room and hitch it onto the oil-fuel tanks; then the Falcon salvaged the oil by blowing it into her own tanks.

One of the divers, Wilson, had found an air-bank with two thousand pounds of air in it, and had released that into a ballast tank. We had blown other tanks from the surface. We had to let all this air go, for we couldn't

take the chance that its buoyancy, in the winter seas, might make the submarine shift her position during the winter.

On November 30, when the oil had been salvaged, Fred Michels and I were sent below with wrenches, to uncouple the line to the oil tank. We each had a wrench, the idea being that one would set his wrench on one side of the coupling and one on the other, and then we could push against each other and unset the coupling.

Just before we went, another diver named Bailey had been brought aboard the Falcon unconscious, but I didn't know from what cause.

I was ahead, and I put my wrench on — this was on the deck of the submarine — and waited for Mike. I heard his wrench drop on the deck near me, but I didn't see him. I thought he had gone to do something else, so I picked up his wrench, put it on, and uncoupled the thing myself, shoving the lower end back into the engine-room so we could put on the hatch.

Then I told the topside I was going down into the engine-room to try to bring up the body of a man that was jammed on top of the engine. We had to lift his waving legs up and go under it every time we had gone aft for six weeks. They said, 'Wait a minute,' and I did, though I didn't know why.

Then they said, 'All right, go ahead, but keep in close touch with the topside.'

I tried to get the man out, but I had to report that it would be impossible to get him out whole, and they told me to leave him alone and come up.

As I started to leave the engine-room, my air shut off

in my control valve. No air supply meant a serious condition. But I said to myself, 'Now you've got air for a few minutes. Take it nice and easy; you've got time yet.'

I went on deck and got my wrench and hammered the control valve down by my waist; finally it broke out the frosting round the needle valve in my control and the air began to come through again.

I called to the topside, 'All right, ready to come up. Anything else?'

They told me no, to come up.

When I got up, they told me Bailey and Mike had both had their air frozen, and that that was what made Bailey unconscious.

We put the hatches on to keep small fish out of the boat, and on December 7 left the S-51 and went in. Some of the divers went South with the Falcon; others were kept at the navy yard in Brooklyn to overhaul diving gear, prepare salvage gear, learn to handle the under-water torch, and such-like work. Lieutenant-Commander Ellsberg made improvements in the torch during the winter that made it cut much faster than before. And an enlisted man devised a hose nozzle for under-water work that let the diver handle one hundred and fifty pounds easily where before he had had trouble to control seventy-pound pressure.

This nozzle made the retunneling, which was, of course, necessary in the spring, much easier than the first job had been. Also the experience the divers had gained in the fall made the work much easier next time.



## CHAPTER VIII

### THE S-51 COMES UP

I SPENT the winter at Newport, doing my regular work. We were notified to get back to the S-51 in April, and the salvage work was actually begun again on April 20. We found, as we expected, that our tunnels had all silted in, but there wasn't much more to be done inside of her beyond checking up conditions. We also found that the tides had washed the sand against both sides, and the sub was buried three or four feet deeper than when we had left it in the winter.

When the tunnels had been washed out again, everything was ready for placing the pontoons. These were steel cylinders, thirty-two feet long and thirteen feet in diameter, sheathed with four-inch yellow pine planking, divided into two vertical compartments by a central cross-bulkhead and weighted with cement in their bottoms to keep them upright. Each one had a hawse-pipe right through each of its two compartments on the center line, vertically; the hawse-pipe was twelve inches in diameter, and the lifting chains — two and one half inches or two and five eighths inches — were passed through these hawse-holes. Each pontoon was fitted with four valves and could be flooded or blown out from the deck of the Falcon, by the air lines which were attached.

The idea was to place the eight pontoons in pairs, one pair abreast of the anchor recess forward; the second



THE SECOND PONTON LYING OFF THE FALCON JUST BEFORE IT WAS LOWERED TO THE SIDE OF  
THE SUNKEN S-4



about abreast of the four-inch gun mount; and a third pair about abreast of the conning tower. The fourth pair was so far aft that its chains were rove under the skeg and inside the propeller shafts forward of the strut bearings.

Less pontoon aid was required aft because the after part of the submarine itself was to be blown out dry and filled with compressed air. The forward part could not, as has been explained, be thus 'unwatered.'

Now it sounds a simple thing to bring a pontoon over the S-51, flood it, and let it sink. One trial of this idea showed that the pontoon might land on the deck of the sub, or it might land sixty feet away, and it probably would land on one end.

A spell of bad weather was made use of to go into Newport Harbor and experiment with this matter of lowering a pontoon. The process as finally developed is a little complicated, but it amounts to this: The pontoon is 'threaded' on the wire cable, which leads down through the two hawse-holes, under the submarine, and up on the other side through the hawse-holes in the 'mate' to the pontoon — that is, the other pontoon of the pair. The chains are then hauled up by the winches on the deck of the Falcon until each one is taut. There are marks on the wire which show, when they come to the surface, just how much of the chain ought to be on one side and how much on the other. When everything is as it should be, one particular link of each chain will show just above the hawse-hole on each pontoon.

The diver, who has ridden the pontoon down as it was sunk, reports to the deck by telephone when his pontoon



is level with the one on the other side. Any inequality is taken out by flooding one or blowing the other till they are even. Then the diver puts a toggle-bar through the link of the chain and locks it there — and that pontoon, or pair of pontoons, is in position.

When all eight pontoons are in position, the submarine is really held in a cradle of chains, and the pontoons are ready to exert 640 tons of lift — far more than any derrick could ever bring to bear on the wreck.

It must be remembered, also, that no such deep-water pontoon job had ever before been undertaken, and that nobody had any experience to guide him in what to do. It all had to be learned as used.

Nothing could be done about sinking the pontoons to place except in flat calm weather. It was difficult enough even then; in any seaway it was out of the question altogether. By the time eight pontoons had been placed, with air leads to two compartments on each of them, and air leads to the various tanks and compartments of the submarine itself, the deck of the Falcon was one fine mess of hose.

The next trick was to adjust the pontoons. One pair at a time was partly blown, just enough to make them rise in their lifting positions, to a little above the deck. They had to be juggled a bit into the proper positions, and then their chains were lashed together thwartships, with wire cables, and wire cables were also led to the gun access hatch and to the gun mount, to prevent fore-and-aft movement. This was a tedious and exasperating and often dangerous job, but it had to be done.

One day when I was down — and we all had plenty

of work to take us down every day — I noticed that there was a slight air leak from one of the forward pontoons. I reported it, and they asked, 'How much is leaking?'

'About half a diver's air,' said I, meaning that the stream of bubbles was about half the size of a stream that would come from a diver's exhaust valve.

The next man also saw it, and reported it. But his estimate was a good deal more than mine. A third man reported it, and again his estimate was larger; it was the largest of the three.

Figuring it out, the officers decided that the pontoon was gaining about five tons of water a day. To keep her in the condition of partial buoyancy she then had, accordingly, they ordered the equivalent pumped into her each day. As a matter of fact, this proved to be too much, and she was gaining buoyancy all the time.

On the night of June 21, there remained only about two hours of work to be done on the second pair of pontoons. This was at ten o'clock at night, and all hands had been working since four in the morning. It was decided to knock off for the night and to clean up next morning, when everything could be cleaned up and the submarine would be ready to be brought up. The reporters and photographers were already standing by for the actual raising.

The early morning of June 22, however, brought fresh disappointment. The weather was wholly unsuitable for the attempt at raising and made it inadvisable for the divers to work at all. More than that, the conditions were growing worse as the morning went on.

It was decided to have the Falcon go into her moorings over the sub, pick up the blowing hoses — which, of course, were all buoyed out while the Falcon was off her moorings — and boost all the tanks just enough to overcome leakage.

Several of the pontoons had been boosted, but not the forward pair. Nobody knew it, but one of that forward pair really had been boosted steadily for days, and had probably nearly her full buoyancy of eighty tons. Also the lift she had been giving the sub steadily had probably helped the S-51 to work loose from her bed.

Anyway, all we knew was that suddenly huge bubbles began to break under the stern of the Falcon, whose captain by lively work managed to swing the stern out of the way just in time to keep it clear as the bow of the S-51 and four of the pontoons suddenly broke the surface and leaped up in a boil of white water.

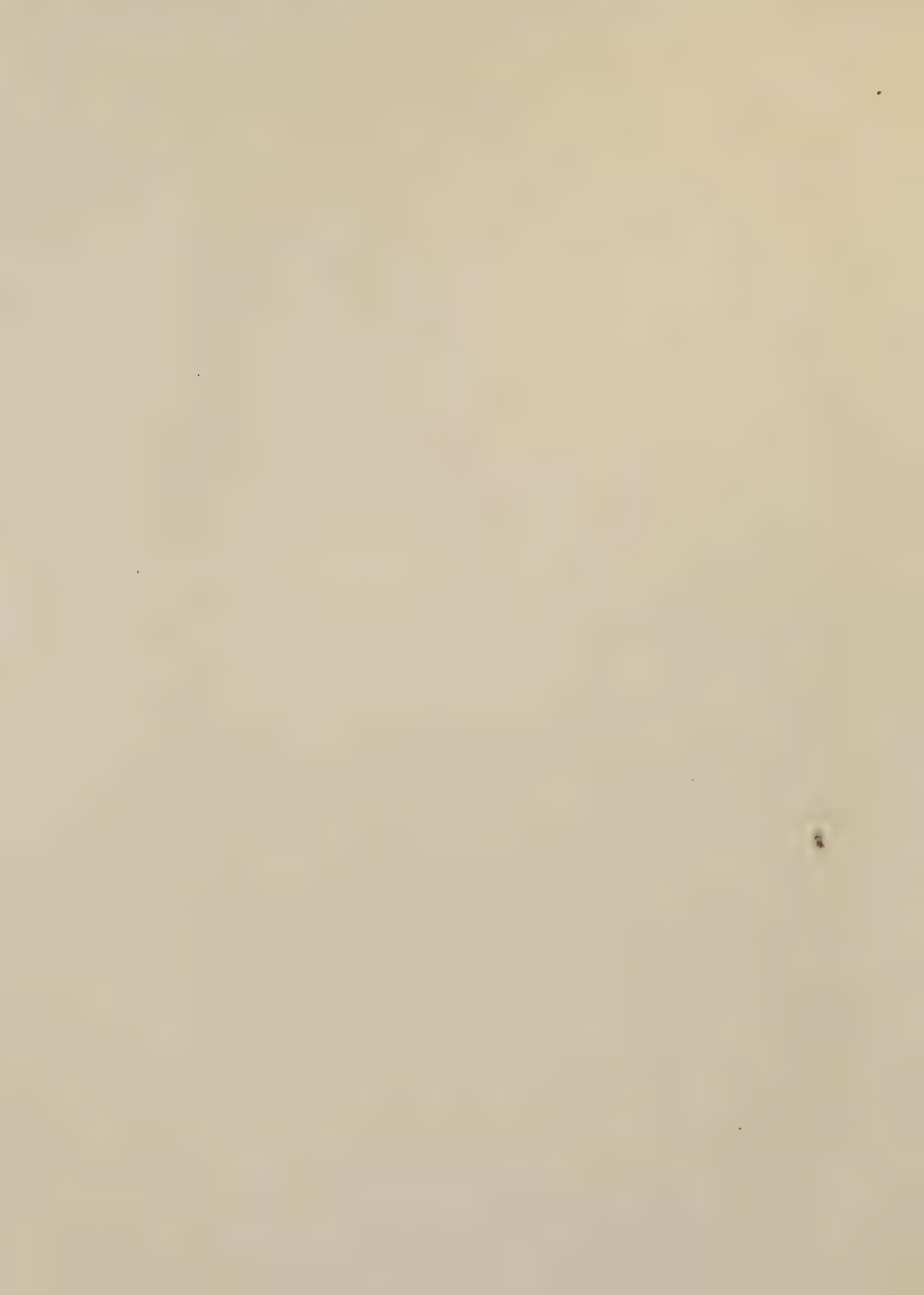
It was a startler, and a great disappointment and cause for chagrin. The last thing that was wanted was for her to start on her own, one-ended, in this way. We weren't ready; wind and sea were rising and there was already considerable swell. But there she was, and there was nothing to do but to go ahead and try to get her stern up even under these bad conditions.

It couldn't be done. The engine-room and motor-room compartments had to be unwatered from their forward ends; owing to the tilt of the bow up, the pumps could not possibly blow out more than half the water in the two compartments. However, the blowing was kept up for three quarters of an hour; then the chains on the aftermost pair of pontoons parted, the pontoons came



THE BOW OF THE S-51 COMES UP PREMATURELY  
Seaman trying to open valves so as to sink the pontoon again





to the surface, and started off by themselves downwind.

Again there was only one possible thing to do — flood the forward pontoons and let the submarine down to the bottom again.

The pontoons were thrashing about in the sea, and boarding them to open flood valves was a terrific job. They called for volunteers, and everybody in sight volunteered. One pontoon nobody was allowed to board; men went onto the other three under such safeguards as could be given them, and managed to get one flood valve open on each pontoon. They filled, and about noon the bow of the S-51 went out of sight again after having been up for three hours.

This, then, was what the newspapers called a 'first attempt,' and a failure, to raise the submarine. It was far from an attempt to raise her, and was a failure only in that it happened at all.

The weather remained tough all that day, and it was not until the next afternoon that we could go down at all to see how bad the mess was. We found that the S-51 had her stern at about the same spot as before, but her bow had swung round somewhat. Also she had rolled over and now had a list of about twenty degrees to starboard. The four forward pontoons were in one grand mess, and there was nothing to do but bring them to the top and place them all over again. They were so badly damaged by the pounding they got when the seas drove them against one another that it was all the Falcon could do, with all her compressors going, to keep them on the surface.

We had just one break. The hundred-ton derrick lighter United States had been brought from the Brooklyn Navy Yard to Point Judith and kept at Point Judith in case there should be need of her, and if the necessary conditions of calm sea should occur when we tried the lift, which had been planned for June 22.

This derrick lighter was now brought out and anchored alongside the Vestal. The four pontoons were 'dry-docked' aboard of the lighter, and the Vestal's repair force worked on them twenty-four hours a day replacing valves and sheathing, patching punctured plates, and welding up leaking seams and rivets. This worked out so well that the Falcon never had to wait an hour for a pair of pontoons when she needed them.

In the mean time we had the tunneling to do all over again. But it was done much more quickly and easily this time. That 'self-propelling nozzle' was a great help, and the men had had experience now.

The nozzle is the simplest thing in the world; the stream of water is delivered partly against a shoulder inside the nozzle, and the stream is considerably narrowed. Five holes are bored backward in the base of the nozzle, and the pressure on the shoulder is relieved by the water that kicks backward and out of the hose through these holes.

That water goes out against outside pressure, and the result is that the two thrusts are balanced so that a man can lay the nozzle on his knee with one hundred and fifty pounds of pressure on, and it won't whip or kick.

We had learned something, too, about handling pontoons and chains. This time the chains themselves were

threaded through the tunnels and 'middled.' They lay on the bottom with their ends buoyed, and the pontoons were lowered on the wire cables; the Falcon hoisting away brought the chains up through the hawse-holes in the pontoons and the divers secured them with toggle-bars — a much simpler way than the first one tried.

Yet in all this simplicity, I got one of the closest calls I ever had. It happened in this way: We were tunneling, and I was washing with the hose as usual. Now, to get the full benefit of the hose pressure, you embed yourself in the mud, and sometimes you fail to notice your exhaust valve on your helmet. Every now and then, as you cut down your air to become less buoyant, you will take in a little water through the exhaust valve, and silt will follow it. That was what happened to me, though at the moment I did not know it.

I had finished, and got onto the stage. I telephoned up that I was on the stage, but in less than a minute I felt myself becoming buoyant. I wasn't getting rid of my air through the exhaust valve, which had been clogged.

The idea is that you must not let yourself come to the surface by becoming buoyant. If your suit is full of air and you start to rise, every foot you rise will add buoyancy. As you go up, the water pressure is constantly less and the air in your suit expands, and you gain speed.

I might have come up right underneath the Falcon, for instance, and with the speed I would gain from that depth I would have quite a driving force — I think it would put your head down around your feet.



I tried to put my hand down and shut off my air at the control valve. I couldn't do it; my suit was so inflated that I couldn't get my hand down. I was just spread-eagled. But I stuck my foot out and caught it in the staging.

Of course, with the air coming in like that, my helmet and breastplate had risen right up and were far above my head. The top rim of the breastplate caught me under my nose, and when I tried to talk into my transmitter I was talking into my suit, shouting to them on the topside to shut off my air. And with my nose held that way, I was speaking very indistinctly. So they didn't understand me.

After a while, me shouting with no results, my suit distended so much that it carried away the buckles on my belt; the straps parted, and the belt with a hundred pounds of lead weights dropped around my feet. I said, 'Here's where I make a wonderful anchor.'

It couldn't last long. The suit finally gave way. It literally exploded, went off like a gun, and then crushed in on me with terrible pressure. My helmet left me, and I settled down on the stage. As I looked up and saw the helmet overhead, I grabbed it and pulled it down on my shoulders, and at once had air. I said to myself, 'I've got air—I'm all right.' And I telephoned to the topside, 'My suit has carried away and my weights are down around my feet. I'm all right, but you'd better haul me up.'

Something in the way I gave the message made them know that there was something wrong with me, but they never guessed how serious it was. They said, 'All right;

we'll haul you up'; but instead of hauling the stage, not knowing, they hauled me on my line, and I took the whole strain on my right arm, holding the line and keeping the helmet down on my head. It was only by hanging onto the slack in the line that I kept them from taking the helmet away from me entirely. The belt was still hanging round my feet.

When I got to the surface and they saw my condition, one man dove overboard to help me. But I motioned them to lower a stage and put it under me. They did, and I swung aboard with my free arm and landed sitting down.

They hauled me aboard then, and rushed me to the decompression chamber, and put on the pressure. The doctor came and looked at me through the port. 'Are you all right?' he asked, and I took down the telephone in the chamber.

The pull on my nose had split the flesh just at the base of it, and I was bleeding like a stuck pig. So I telephoned to ask him to give me something for my sore nose — it was hurting me a good deal — and about 'four fingers.' I took no ill effects from the experience, and was ready when the time for my next dive came round. I had no following ill effects from the experience.

We often got fouled on this job. There was a strong sweep of tide there — a fisherman told me that if the submarine had been sunk half a mile farther out or farther in there would not have been so much current. The tide would carry your lines off in a sag, making a great curve from where the tender was holding them out down-tide and back to you. If they tried to take up the

slack, it made a pull on you and you had to work against that strain. And so much slack meant a greater chance of fouling.

The greatest cause of fouling was the light wire. If we carried a light below — say you were edging along sideways in a narrow passage, and all passages in a submarine are narrow to a man in a diver's suit — and had to pass the light from hand to hand, any time you turned and forgot to take care of which way that light wire led, you would take a turn with it round your own hose and life line.

If another man was following you in and came to the light wire, and lifted it over his head and came along, he would put a turn round his own line and hose, and there would be the two of you tied together by the light wire.

Once three of us fouled at night; our lines and the light wire were all snarled up, and it took us a long time to get them clear. More than once I had to go down to clear other men who had got foul.

The reporters wanted to know, as soon as the S-51 was on the bottom again, how long it would take to get her ready for raising again. The estimate given to them was two weeks; the S-51 was actually brought up in one day less.

The towing arrangements had to be set up before the submarine left the bottom. Two bow towing pendants were set on — a main and a preventer, and a stern pendant, or stern-fast — and the Sagamore ahead and the Iuka astern picked up the ends of these pendants. The Falcon was moored on the starboard side of the S-51, and the S-50 and the S-3, with fully charged air-banks,



THE S-51 APPROACHING HELL GATE BRIDGE





took station on the Falcon's starboard beam, ready to give her their air to help out in the blowing operation.

The plan was to bring her up stern first, so that the three compartments might be fully unwatered, and so that the chains of the forward three pairs of pontoons would be forced onto the increasing bulk of the sub rather than allowed to slack off toward the bow, when the lift came.

On Monday, July 5, at 5 A.M., the Falcon went into her moorings for the last time. The divers were overside by seven, doing the final cross-lashing of the pontoons. All necessary work was finished during the morning, and blowing began just after noon.

The stern came up, as planned, about 2 P.M., and the bow, also strictly on schedule, at almost exactly 3 P.M. And except for standing by, ready to go over if an emergency arose, the divers' work was apparently finished.

The Falcon shifted to a position astern, taking the stern-fast over from the Iuka. The Falcon had a special frame, U-shaped, put up on her stem, and over it ran twenty blowing hoses, sixteen of them connected to the pontoons and the others to the compartments of the sub that had been unwatered.

The Sagamore started her engine about 4 P.M., and the tow was under way, heading first for Point Judith till it was over the sixty-foot depth curve, and following that curve as far as practicable.

Down Long Island Sound went the tow, and passed the Race at 3.30 A.M. on July 6. Shortly before that time, finding that we were too early, Captain King made two or three wide sweeping circles, west of the

Stratford Shoal, to lose distance and gain time. He didn't want to arrive at Execution Rock too early.

It was better to keep the tow under way with everything in adjustment than to stop and invite trouble with towing gear and the blowing hoses.

A navy yard pilot and an East River pilot, who had been specially requested, came aboard the Falcon at 3 A.M. for conference, and then the river pilot was formally placed in charge of the tow and put aboard the Sagamore, ahead. A jury flagstaff was set up on the S-51, and the submarine and all vessels in company put their flags at half-mast. For we were escorting dead men.

The tow passed Execution Rock, on the last leg of its 145-mile journey, about 5.40 A.M. No difficulties of any kind were met; the tow made all the turns without trouble, and even the celebrated eddy at the southern exit from Hell Gate caused only a slight sheer.

Queensboro Bridge was passed; Blackwell's Island was astern. And then, even as it seemed to those on the Falcon that the pilot was farther to the eastern side than the Vestal, acting as guide-ship ahead, had been, the tow struck on Man-of-War Rock at high water, about 9.15 A.M. The report written by Captain King afterwards says, 'The pilot has yet satisfactorily to explain why he carried the tow so far to the east side of the deep-water channel that the small sheer, which he claims to have occurred, should have caused the wreck to strike.'

We were in plain sight of our goal, the Brooklyn Navy Yard. And it is not too much to say that all hands were fairly stunned when they saw the towing pendants snap,

saw the chains on the second pair of pontoons fly, and the wreck settle to the bottom.

It was Ellsberg who said, as we sat looking at it, 'Well, here's another job — let's get at it!' That was the spirit that he had shown all the way through.

The first thing to do was, of course, to find out the real conditions under the S-51, how far she was on the reef, and how much she had been hurt. I went down on her starboard side, and found a very strong current, even though it was just past high water.

I got under the submarine's body, and could hear her grinding and complaining all along her body. It was a terrifying sound. She was fifty-two feet on the reef, and so far as I could see not badly hurt. I came up and reported, and by that time the navy floating derricks were on their way up from the yard.

The forward pontoons were not fully blown. So the derricks took a strain on the chains and men pulled the toggle-bars out. Then the pontoons were sunk so they were just awash, and at such a link the toggle-bars were put in again, keeping the pontoons equalized. Then they were blown completely, giving their full lift.

The second pair had gone adrift and were let go. They were picked up and towed into the navy yard by some one else.

When the crew were adjusting the third pair of pontoons, a derrick strap let go when an officer and three men were on top of the pontoons. The pontoon dropped, and those men were in great danger of being swept under the derrick lighter. They kept their heads, and two of them stuck their thumbs in the vent-pipes, which had



been broken off, and stopped them until wooden plugs could be brought and driven in, so that the pontoons should not sink. It was just another bit of nerve.

At high water that night, about 9.15, two tugs hooked onto the Falcon and pulled astern on the sub. There was a doubtful moment, but finally she came off and was towed, Falcon and S-51 both stern first, down to the yard.

There was another desperate interval almost at the last minute. A turn had to be made to put the submarine into the drydock bow first, and when they came to make it!

The ebb tide was running so strong that it tossed the tow around, heavy though it was. The Falcon went astern as hard as she could to hold the tow off the big dock that sticks out there, and tore her own bitts out. For a long time there appeared to be no headway whatever; finally, however, the power took hold and beat the current, and the turn was made.

The S-51 was left outside the dock for the night, as she was to go in on the high water. After she had crossed the sill into the dock, I was sent down to make sure that none of the wires and cables that were trailing after the wreck were lying across the sill. If there were any, the gates could not be closed tight.

I found some half-dozen of them, gathered them up as I went along the sill, and bent them onto a line I carried, to be hauled out by the derrick on the dock. Then the gates were closed.

It took the dock people all next day to get the S-51 straightened up from her list so that she would settle



LIEUTENANT-COMMANDER ELLSBERG WITH DIVERS WICKWIRE  
AND EADIE (RIGHT) ABOARD THE FALCON



LIEUTENANT-COMMANDER ELLSBERG, CAPTAIN KING (IN CHARGE  
OF SALVAGING THE S-51), AND CAPTAIN HARTLEY OF THE FALCON



down upright on the blocks. And my final job was to wedge the blocks that support her rolling chocks, reporting meanwhile on how she was settling. I did that work on one side, and a navy diver on the other.

When the submarine had got into the drydock, I asked Ellsberg if I might go home. He said he would need me for some more work. When the blocking was completed and the dock unwatered, I asked again if it were all right for me to go.

Admiral Plunkett was standing by, and he heard me ask. He said, 'You can't go now, Eadie. I'm getting up a theater party for to-night, and it wouldn't be any party if you weren't there.'

I explained that my wife was alone and very nervous, and said I'd like to go as early as possible. He answered, 'You'll have plenty of time to get the midnight train, and we'll see that you get it.'

I said I'd rather catch the Fall River boat and get home early in the morning. He growled and I persuaded, and finally they let me go, and I did get the boat. I turned in, but as we went back over the course I had just come down, through so many anxieties and perils, and by dint of so much heartbreaking work, I didn't sleep. I lay awake thinking over the incidents, one after another, and I was on deck when we passed Point Judith.

It had become known in Newport, where every other man seems to be a navy man, that I had had success on every job I had been set to do where others had failed. There was talk at the station, of course, and it got over to the city, with the result that I got a good deal of con-



gratulating from the very first day. The city also held a meeting for me, and presented me with a set of resolutions. At the yard, I got one continuous reception — indeed, it is still going on over there.

The commanding officer sent for me, and personally congratulated me on my work, and told me of the letters that were going forward through channels.<sup>1</sup>

By this time the letters were beginning to come in. You'd be surprised at the amount of mail I got, from organizations and from individuals of whom I had never heard.

Well, I was still in the naval reserve, so in August I had to make my fifteen-day cruise for purposes of training. I went chief gunner's mate in the Childs, one of the destroyers, and while on the trip received notice that I had been granted the Navy Cross, the highest honor that the Navy Department can bestow on an enlisted man. The cross and the signed citation from President Coolidge got to my home before I did.

Several other divers got the Navy Cross, and Captain King, Lieutenant-Commander Ellsberg, and Lieutenant Hartley, commander of the Falcon, received the Distinguished Service Medal.

And that, so far as I was concerned, was the end of the story of the salvage of the S-51.

<sup>1</sup> See Appendix I.

## CHAPTER IX

### BACK IN THE NAVY

AFTER the completion of the S-51 job, I was still a civilian employee, ordnance man and diver. But the dramatic force of the S-51 job, and the fact that I had been given the Navy Cross and a good deal of publicity for my part in it, began to have an effect. I had a lot of letters, many of them from strangers, and I began to hear that something might happen in the Department.

The first proposition was to count all my service as active service, which would have retired me then and there. But that was outside of the regulations, and could only be done by Congressional action. I heard that the Secretary of the Navy thought it would not be well to establish a precedent, nor to ask Congress to break over the rules of the Department by making this exception. I don't really know what happened, but anyway, the matter never went up for action at all. I didn't attempt to force it, though I was told that I could have got it acted on, at least. But I don't like getting things that way.

To compensate me for not getting that, the Department made offers. One was an appointment as supervisor of diving for the First Naval District, in a civilian capacity. It looked pretty good, but I had to remember that it would come without Congressional action, and a man could be removed from it by word of mouth.

Then they offered me a chance to go back into the

service again as a chief gunner's mate with a permanent appointment. And when they added to that offer the promise of duty at Newport, where my home is, I accepted.

The day I reëntered the service was December 15, 1926, just six years to a day from the day I left it. Since then I have gone right along with the old game, diving and instructing. I am still supervising the instruction, though I do not take the classes directly myself.

Until our second major submarine disaster in December of 1927, my work was largely routine — searching for objects on the bottom, some submarine construction at the station, and the like of that. The destruction of the coal barge that was wrecked on Point Judith I have already described; that was in August, 1927.

It was in that same year, however, that I got a job which had enough unusual features to be interesting. It also contained a problem which was solved in a way that I think was probably never before used.

A steamer from Providence, coming down the bay with freight and passengers, ran ashore during a blizzard on Rose Island. She went up good, too; at low water you could walk out to her in rubber boots. The passengers were taken off, and tugs were sent for to try to pull her off the ground. They parted all kinds of hawsers, and then decided to see what was holding her, and asked the station for divers.

I was sent up in the station diving boat and went down to examine her hull. I found that she had run neatly in between two big rocks that were holding her upright like a cradle. Then I found a really big rock

right at her stern, and that was what was holding her. If we could get that rock out, it looked as if the ship could come off all right. Another 'if' was contained in the question whether the rock was the outcropping of a ledge or just a big boulder supported by clay.

I started washing round it and under it to find out, and when I had cut enough ground from under it, the rock settled down nicely and far enough so that the ship could slide back over it without damage.

It was a miracle that the ship had got in as far as she did, for astern of her were plenty more rocks, and it was up to me to survey the safest way out for her. This I did by working back and forth across what would be her natural path. Every time I came to a rock, I would 'give them a jingle' on my life line; my boat would come over it and take its bearings. So I gradually worked out a channel astern, and when they took another pull on her, she came off nice and easy, and her pilot, knowing where the rocks were, could get her out past them safely. There was no reward on that job, though I had undoubtedly saved the owners a good many thousands of dollars. Two young fellows from the station worked with me on it, and did good work, too.

After I had that experience of nearly losing my life from lack of air and inefficient tending, I went right on with my work, though I found that for a long time I was slowed up.

Officers who had watched me on jobs near the surface, such as propeller jobs where you could see the diver at work, have often remarked on my speed under water. They could see me go in and out, back and forth, taking



out turns or clearing a fouled line, and marveled that a man could move so fast and keep up such strenuous exertion in water. I wasn't so fast, and as a matter of fact I never have since been as fast, as I was before that accident.

One little job that might have had a terrible ending, I remember happened during this time. One of the naval tugs, just moving from one dock to another, caught a cable in her propeller. The tug was wanted in a hurry, so they sent down a young fellow who was on the spot, at the same time sending for me with the idea that he probably couldn't make headway as fast as I might.

When I got there, the young fellow had just come up and was asking for a hacksaw. I said, 'What is it she's got?'

'I don't know what it is,' said he. 'But it's a heavy armored cable of some kind.'

'What do you want a saw for?' I asked him.

'That's the only way I can see to clear it,' said he.

I said, 'Well, you'd better come in the boat.' He came aboard, and I got dressed and went down. Of course, I hadn't any idea what the cable was, but I knew that there are cables of all sorts all over the bottom, round the station and across to the city — telephone cables, lighting cables, and what not. At one time we lighted the entire city of Newport from the torpedo station plant.

I found the heavy armored cable all right, and even then I didn't recognize it for what it was. I found that by bending a light line onto it and letting the men

aboard the tug lift, I could pass the bight over the propeller, and in that way take off one turn at a time till she was clear.

When I had it cleared, I came up. Then I found that it was an electric power cable from the training station to the torpedo station. She was carrying two thousand three hundred volts — and you may imagine what would have happened if that poor young fellow had cut into her with a hacksaw!

There must have been a loop of it standing up from the bottom, and an extremely low tide, for the propeller to slide into the loop. Then the tug must have just wound it round and round until it stopped her.

The next real thing in my life was the job that attracted the attention of the whole country — not so difficult a job by any means as the S-51, so far as the actual diving was concerned, but because of the conditions under which it was done it was a job involving more suffering and hardship than any other I have ever had. It was, of course, the attempt to rescue the crew of the S-4, and later, the salvaging of the boat.

On the S-51, we were in the open sea and working at one hundred and thirty feet depth. On the S-4, we were only one hundred feet down, and that extra thirty feet means a much greater pressure. But on the S-51 we simply laid off the job altogether when the winter weather came; on the S-4, we continued working right through on every day when we could dive, from December till we got her up in March.

About four months before the S-4 disaster a thing

happened that put me, I think, in the tightest position I ever had, and had the most serious following effects of anything that has ever happened to me. The buoy-pendant on one of the destroyer moorings in the harbor had carried away, and the mooring was lost. Two civilian employees had the matter in charge, and they got me to go out to get it.

They came down by appointment at 12.30. Well, it happened that I had another job on for that afternoon, and I was anxious to go right out on the search for the mooring. But it also happens that the civilian employees go to work at 12.30 and the sailors don't go till one. So there was only one man in my boat — a young fellow who afterwards did fine work, and in fact was one of the men on the S-4 job. But rather than wait, I went out with only the one man — and, by greatest good luck, the two civilian employees. They were both ex-service men and had seen diving done before.

We anchored the diving boat about where the mooring ought to have been, and I went down and began my search. But I seemed to be wide of the right location, and, after making a good many circles, I came up.

They said they thought the mooring must be astern of us, so I paid out a good deal more of our line and dropped my boat back. Then I went down again and began the search all over.

Now I was diving, of course, from a flask — that is, the diving boat is equipped with two flasks of compressed air; they are charged from a line on the dock.

I didn't take any notice when I went down how much

there was in the flask that was in use, for I knew the rule and the tender knew the rule, that no flask is ever to be used when the pressure falls below two hundred and fifty pounds. When it gets down to there, that flask is shut off and the other one is turned on. If that one also gets down to two hundred and fifty pounds pressure, the diver is told to come up. This rule is made so that there never will be a time when a man is down that there isn't plenty of air to bring him up, and also, if it should happen to be necessary in an emergency, to send another diver down to help him.

The first thing I noticed was that I was getting less air. I signaled for more air, but got no response. I had for some time been opening my control valve to increase my air supply, till it was wide open. That was when I began to signal, for on the last adjustment there had been no hiss of air coming in.

Of course, the tender wasn't paying proper attention to his job. But I, down below, couldn't understand what had happened. All I knew was that the air in my helmet was getting foul very fast, and that I couldn't get any more.

I signaled that I was coming up, and got a reply. But they didn't pull me up, so in a minute I signaled again — four pulls — that I was coming up. Again I got the reply, but still they didn't pull me up.

Again and again I tried it, but always with the same result; I got the reply, but no pull-up.

I figured what I had better do, but I'll say this — I couldn't see much of any way out of this jam. I had been in a good many tight places and had got out all



right, but this time there seemed to be no answer whatever.

A curious thing — what I was thinking, when I had about come to this conclusion — was what they'd say when it was all over — 'Well, there's one time he didn't beat it. They got him at last.'

First I figured I might slip off my belt and shoes, and come to the top. But I realized that, even without belt and shoes, I shouldn't have enough buoyancy, and the exertion of getting them off would be more than I could do.

I figured I might try to walk to my own boat's mooring, and go up on that. But it was too far for me even to walk.

I was going fast when they finally did pull me up. I wasn't actually out, but when they got me into the boat it was fifteen minutes before I could speak. Then I found out what had happened. The first thing I said was, 'Look at the gauge! I can do on a very little air, but I must have some — I insist on having some air.'

I had been suffocating with a full unused flask of air in the boat. If the tender had been watching the gauge, he would have seen that one flask was completely used up and would have turned on the other.

Between the flask and the diver's line there is a reducing chamber and the gauge is on that. The air comes into the chamber at flask-pressure and is there reduced to whatever pressure the diver needs. Our pressure in the boat had been kept set at eighty pounds, and, of course, when the pressure in the flask ran down below that, no more air fed.

The civilians had watched the signals coming on the

rope and had seen my tender answer, so many times that they began to wonder what was the matter. One of them had asked him, 'What do four pulls mean?'

'That he is coming up.'

'Well, why don't you pull him up?'

'I'm waiting for him to show up.'

The young fellow said he had been told that the diver would make himself buoyant and come to the surface, and that all the tender would have to do was to take in the slack.

The civilians said to him, 'Well, you'd better take a pull on him, hadn't you? He's signaled a dozen times and hasn't come up. There may be something wrong with him.' So they had hauled me up.

As soon as I had recovered a little, and was as near normal as I could be under the circumstances, I went down again. I had found the mooring chain before I quit and had made my distance line fast to it. So all I had to do when I went down again was to carry a buoy line to it and make it fast.

When I got home that night, my heart was going like a triphammer. It didn't get any better; the least exertion set it to fluttering, and I went to my doctor. He told me that I would have to take it easy, that my heart had had a severe strain. I was under his care for three months, and as a matter of fact I still feel the effects of that experience.

You can imagine my feelings on the night I was sent for to go to Provincetown on the S-4 job. All that long ride in the machine from Newport I was hoping and praying I would be able to do my stuff, but in my heart and soul I was thinking I would be a false alarm.

## CHAPTER X

### THE STORY OF MICHELS

WHEN the submarine S-4 was sunk off Provincetown, the disaster was due to so many little things, one after another, that a man couldn't be blamed if he came to think Fate took an active hand, as if some power actually did one thing after another to make sure of killing those forty men who were in her.

To begin with, the submarine and the coast guard destroyer that hit her were practically the only vessels anywhere near the entrance to Provincetown Harbor on that rough winter afternoon. There was a stretch of clear water seventeen miles broad, and only the most exact calculation could bring the S-4 up from her submerged run at exactly the second and exactly in the spot where the Paulding couldn't help hitting her.

If she had come up ten seconds sooner, her periscopes would have cleared up enough so that she would have seen the Paulding rushing down on her. If either boat had been a scant hundred feet from where she was, there would have been no collision.

But they did meet, and the Paulding rode right over the submarine's forward deck, and sliced into her battery-room, breaking off a part of her own stem and leaving it in the gash.

Down went the S-4 in one hundred feet of water, and by what we found later we know that this was what happened down there in the depths:



THE COAST GUARD DESTROYER PAULDING, WHICH SANK THE S-4



THE PAULDING AFTER THE COLLISION





Six men were forward, either in the battery-room where the Paulding's bow came through, or in the torpedo-room at the extreme bow. They got into the torpedo-room and closed the door between it and the battery-room; one of these men was Lieutenant Fitch, the torpedo officer of the S-4. It is very likely that these men had got the door closed before the S-4 hit the bottom, for she went down on a slant and struck nose first in the soft mud, righting herself as she settled down.

The others of the ship's company — thirty-four men — were in the central operating compartment, and the engine-room and motor-room, aft of that. They likewise made their first business to close the door from the central operating compartment, the C.O.C., to the battery-room where the water was coming in.

All hands must have been thrown down when the S-4 heeled to the blow of the destroyer, and so it took a few seconds to close that door. Close by it was the central switchboard, the very nerve center of the boat, and over the door was the big ventilation pipe, passing through the bulkhead. This pipe was of thin copper.

The first thing those men could have known, the water pressure on the battery-room side of the bulkhead crushed the thin copper pipe, and a torrent of water came through into the C.O.C.

They knew there were two things to do — one was to close a flapper valve in the pipe, right in the bulkhead itself, and the other was somehow to keep the water from hitting the switchboard and short-circuiting the whole thing.

Nine times out of ten they would have succeeded. But just beyond that bulkhead, on the battery-room side, were the officers' quarters, and in front of the commanding officer's quarters hung a flimsy portière. When the ventilation pipe crushed and the water began to go through, its current pulled the tail of that portière right up and under the edge of the flapper valve. The men couldn't close it tight. The water kept on coming through.

They got a blanket and tried to shelter the switchboard with that. Again they failed; the switchboard flashed, and burned one man badly. His comrades carried him aft and put him in a bunk, and there we found him.

Those men fought to the end. They were driven out of the C.O.C. and into the engine-room and motor-room, and were drowned.

Meanwhile every bit of help possible was being rushed to Provincetown, and less than twenty-four hours after the submarine was wrecked, it had been learned that six men were still alive in the torpedo-room.

It was in the attempt to hook up to the submarine's salvage air line and get air through to these six men that Fred Michels almost lost his life. And it was against this final attempt that Fate, or whatever cruel power we were fighting may have been, put up one last terrible deception.

Communication had been established with the men inside the submarine. The topside sent them a message to take the gag out of the salvage air line, by way of getting ready to force air down to them. They replied

that they had already taken out the gag, and that water came out of the pipe. They were standing in eighteen inches of water then, and there was a slow leak making it steadily deeper.

When water came in through the salvage line, they hastily put the gag back, to keep out what water they could as long as they could. But if they had not put it back, the water would have stopped coming; there was no break in the air line, though they believed — and the topside concluded from their report — that the line was ruptured.

Such a storm was raging on the surface that the Falcon, the rescue ship, had already dragged her anchor. For a diver to go overside was practically committing suicide. Yet I believe that but for that report another man might have tried it if they ever could have held the Falcon.

As it was, though they by no means gave up hope of saving those six men, they used the time when they couldn't go down to save Fred Michels by rushing him to Boston to the Naval Hospital. He had to be kept in a decompression chamber; the Falcon was the only vessel with a decompression chamber, and she went to Boston, through a big gale that didn't reach its height until next day.

The Falcon was back the same day she left, but was forced to lie all the next day idle because of the terrific wind and sea. On the third morning, we found the storm had carried away the marking buoy, and we had to find the wreck all over again — and by that time, the six men in the torpedo-room were gone.



For the divers, there was still more weary luck to come. The newspapers had roused public indignation by the manner in which they reported the Falcon's leaving the sunken submarine while there was still life aboard of her, and there was so much expression of feeling against the Navy that it was decided to go on with the salvage work right through the winter. In the case of the S-51, we left her, when the weather got too bad, until spring.

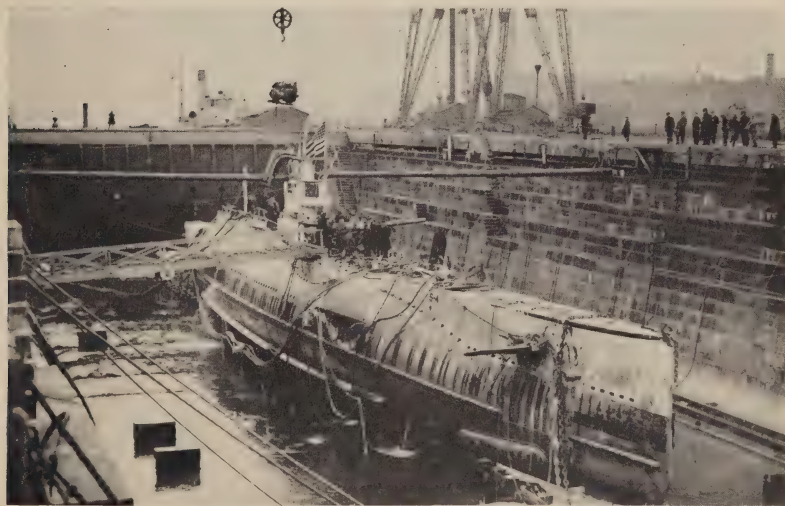
Some of the newspaper writers would no doubt be indignant if they were accused of causing needless anguish to the families of the men lost in that disaster. Yet common decency at such a time demanded nothing more nor less than a strictly truthful account of the work at Provincetown. There was sufficient tragedy in the accident itself without leveling the charge that the Navy was more concerned with salvage than with rescue.

Deep-sea diving in winter, in these latitudes, is torture anyway. Besides, it is very dangerous because of the liability of a diver's air freezing and clogging his control valve, so that he gets no air. When that happens, one of three things must follow: either he must somehow break the frost in his valve and get air again, or he must get out of whatever place he may be in, inside the sunken craft, and be hauled to the surface — or he must suffocate where he is. But we went on, and after a new apparatus had been invented for pre-heating a diver's air, we got along better, though, of course, all the time suffering from the cold of the water.

The Paulding struck the S-4 at 3.37 on the afternoon



THE S-4 IN DRYDOCK AT THE BOSTON NAVY YARD



THE S-4 IN DRYDOCK, SHOWING THE WOUND



of Saturday, December 17, 1927, and I first heard of it through a telephone message from the Newport torpedo station to my home in Newport, at 6.15.

I had been in Fall River with my wife and daughter that afternoon, doing Christmas shopping, and we had just come home and had had our supper.

‘Come to the station immediately,’ was the order on the telephone. ‘The S-4 has been sunk.’ I was in civilian clothes, but I changed into uniform, got out, begged a ride to the ferry — which is about a mile from my home — and caught the boat that left at 6.25. I remember that, during that whirl of changing my clothes, my wife was standing by, wildly anxious, and I was trying to tell her what had happened and dress at speed at the same time.

At the station I was met by Commander Causey, the executive officer. He told me the details of the disaster, and asked me what gear would be required. I said, ‘Hardly any; only men will be needed. The Falcon will undoubtedly have all the gear that is needed.’

He said word had been sent to all the station’s divers, but that I was the first to report. They were even then coming in one by one: Michels, Carr, who was a member of the Falcon’s crew, but was on leave at his home in Jamestown, Bailey, Burd, Brown, Winters, Anderson, Hawkes — there were about eleven in all.

We left in three machines. Captain Hart lent his; Commander Causey his, and Lieutenant Matthews not only gave his car, but drove it himself. While we were loading up the cars, the Captain called up the State Police and asked them to meet us and clear a way for us.



We were met at the Two-Mile Corner outside of Newport, and the motor-cycle policeman pulled us along all the way to the outskirts of Fall River.

In the meantime, word had been telephoned ahead to the Massachusetts State Police, and we were met in Pleasant Street, Fall River, by one of their men. He took us as far as his authority would take him, and then said, 'You've got a hundred miles straight away now. Good luck to you; I wish I could go with you.'

Lieutenant Matthews said, 'All right. Now, boys, you can settle back for a sleep.' Can you imagine anybody's sleeping with the thought of what we were coming to on our minds?

Of course, we talked a good deal over the possibility that there might be still somebody alive in the submarine, but we were well agreed that there was practically no chance — that it was just another salvage job.

We couldn't see the reason for all the hurry, in fact — and we were certainly hurrying. It was one of the wildest rides in my whole experience. But I think the Navy Department should be given great credit for carrying on when anybody connected with the game and knowing the conditions would have said that there wasn't a chance in a thousand that life still existed in the submarine. You see, she was sunk while still submerged, and that meant that everything would be open below, and if she had sunk she was cut into, and if she was cut into she would have filled with water.

We were going fast, and we didn't know the roads too well. So we had many a quick stop to make sure of our way; once in so often all of us would be piled up in a

heap in the car. It was a wonder that with three cars traveling like that we didn't have an accident. We did have a narrow escape in New Bedford from a collision with a trolley car.

We reached Provincetown at 12.30 that night. The Falcon wasn't in; she had been at New London, and on the first unconfirmed report had begun to make ready for a quick start. They were all ready to let go and start when the report was confirmed; she was under way just sixty-eight minutes after the first report reached her. She got in early the next morning.

Lieutenant Matthews went to report our arrival, and returned about 2 A.M. He decided that, as we couldn't get out to the wreck, we would better get a little sleep, and he got rooms for us in a lodging-house.

The town was already swarming with reporters and photographers. They were all over us; they wanted to know who we were, where we came from, how many of us there were, and when we were going out.

Even after we got turned in, one man came into our rooms. He asked so many foolish questions that the crowd began kidding him. I was laughing myself sick, and I'd say after each story they'd tell him, 'Tell him another.' Later, I realized that when you kid a reporter you are really kidding the public.

A young gale had been blowing all the afternoon and evening, and next morning — Sunday — it was even worse. The only boat safe for us to go out in was a surf-boat belonging to the coast guard at Wood End.

They took us out, with a dory towing astern of the surfboat. When we got out to the scene of the wreck, it

was so rough we couldn't go alongside the Falcon. So we went to windward of her, and two of us got into the dory — I was one of the two. Then the men in the surf-boat slacked her down alongside the Falcon, I threw my suitcase aboard, and when there was a chance I climbed aboard myself.

Captain Hartley met me. 'Eadie,' said he, 'you'll be the first man to go down.'

I said, 'All right, sir, as soon as I get into my gear.'

We were not even sure then that we had the S-4's position. The coast guard had grapneled, and had hooked onto some object on the bottom. But what they had caught onto could not be known until the catch was 'proved' by a diver.

The Wandank was already at Provincetown, lying in the inner harbor. During the day the Bushnell arrived, and she served as a repair ship and machine shop, though she was not nearly so elaborately outfitted as the Vestal, which we had had on the S-51 job. The Mallard also arrived, and tugs from the Boston yard.

The Falcon was anchored right over the submarine, on the mark set by the coast guard. She wasn't moored out, for there was too much sea running to place moorings, and it wasn't yet sure it was the submarine we had found.

I went over the side on the stage. It was bitter cold; the vessel was rolling, and but for the many hands that crowded to hold the stage steady, I should have been smashed against the Falcon's side.

They lowered me quickly, and I was soon below the send of the sea; for you get the forward motion of a sea

only so far below the surface as its height above the surface. That is, a wave five feet high will give you a 'send' five feet below the surface. When you get deeper than that, the only effect of the sea on the diver is the varying pressure when a wave passes over him. This is a serious effect — and in deep-sea work, where there is always more or less of a swell, it is always present. If a wave two feet high passes over you, you get a sudden increase of pressure amounting to one pound a square inch — really almost a ton on your whole body.

As soon as I was well under the water, I tested everything, telephone, valves, and the suit for leaks, and then left the stage and slid down on the grapnel line. On that dive I wore a suit with gloves on it, and carried nothing but a hammer with me. The hammer was for the purpose of tapping signals on the various compartments of the submarine, though I never for a moment thought there would be such a thing as life aboard of her.

I went down one hundred feet in less than fourteen seconds, and landed between the two periscopes. I had come down so fast that my shoes hit there with a clang that was heard by the six men imprisoned in the torpedo-room. And I thought I heard a signal.

I said at once over the telephone, 'It is the submarine.' Then I looked round. The visibility was very poor. The current was running thwartships, and stirred up the mud, making the water terribly murky. To make it worse, the day was overcast, and so there was very little light there at all.

I jumped down to the forward deck locker, and this time I heard another signal, and heard it plain. They



were pounding, inside of her, and I said, 'My God, a signal!'

I knew exactly where it came from, and I didn't have to waste my time running around frantically hunting for it, but could run directly to it. I had to climb over the gun, which was slewed round to port, and had its breech up and its muzzle down.

As I walked—or rather, ran—along the narrow deck, I found loose pieces of wreckage lying about—bits of metal that I could pick up and throw overboard. They were bits broken off the Paulding and off the S-4's own superstructure deck. Larger twisted and bent pieces were all snarled up in a heap forward of the gun.

The Paulding had ridden right over her, and I could see where she had cut across the superstructure deck to within four inches of its outboard edge.

I climbed over the gun, and into a tangled mess of wreckage. The way she looked, she was far worse off than the S-51 ever thought of being—that is, going by the open wreckage you could see.

I picked my way over the mess to the place where I knew the sounds were coming from, the torpedo loading hatch. This is the only opening from the deck into the torpedo-room, and the way those men would have had to come out if they came at all. The men were pounding on the torpedo-room hatch, which is just inside the loading hatch. That loading hatch, by the way, has on its inner side two little tracks; it doesn't open all the way back, but is stopped on a slant, and when torpedoes are being loaded, they are cradled in the two little tracks and slid down on the proper slant.

I banged with my hammer a number of times on the hatch, holding my other hand down on it to feel the vibration of any response. I got a response at once, and it seemed to hit right under my hand. They made six taps. Every time they signaled, it was six taps.

The vibration of it was so strong that it was transmitted through my body and to my telephone line. The man tending my telephone told me afterward that before I told him there was life aboard, he already knew it. He said, 'I could hear your signal and their answer, and I could tell the difference between them.'

As soon as I had their answer, I banged the hatch again a few times as a message of good cheer; I didn't have any Morse, but I just let them know we were on the job. I telephoned to the topside, 'Life aboard in forward torpedo-room.' Then I headed toward the bow of the boat, telling them over the telephone I was doing so. I found the bow was covered with mud. This showed that the boat had gone to the bottom on a sharp angle and had scooped up the mud with her bow. She was lying on a level keel, both fore-and-aft and thwartships.

The idea of going to the bow was so that the people on the topside could trace my bubbles and so know the boat's position as she lay on the bottom, and would know how to set the moorings as soon as it was possible to go to work.

I reported every bit of information, as fast as I came to it. I told them, 'There is a mess of wreckage' — 'She looks very bad; worse than the 51' — 'I am on the

hatch' — 'I am on the bow' — 'Her bow is covered with mud' — 'I am now going aft.'

All this time the men inside never sent another signal. I figure that they knew what I was doing, and that I would try to signal other compartments. If I did, and they replied, they knew it would only confuse me, and so they kept still.

'Gee, Eadie,' I said to myself, 'if you never do anything more in your whole life, inspire those men in there with the confidence that we on the topside are onto our job, and doing every last thing we can.'

I fully realized their predicament, and that because of the bad weather and heavy sea at the surface we had little chance to work quickly — and only speed could save their lives.

I got aft to the conning tower and tapped on it, but got no answer. Worse than that, you can tell by the sound when you tap a metal plate like that whether the space behind it is full of water or empty so that it sounds hollow. And I knew the conning tower was full.

That one thing alone settled the question of the crew being able to do anything to help us help them. The control-room, or central operating compartment, was right under the conning tower, and I knew it was full of water.

The men forward didn't signal even when I tapped the conning tower. You see, they could figure exactly what I was doing.

Now I ran along the deck, going aft, until I was brought up by a sudden jerk. In my anxiety to cover the ground as fast as I could, I had not been as watchful

as I should have, and I had run into the boat's tangled radio antenna, which had been carried away by the collision. It was foul on one side of my helmet on the spitcock, and on the other side on the exhaust valve.

They noticed on the topside that I had stopped, and that I hadn't traveled the length of the boat.

'Are you in trouble?' the tender asked. 'What's happened?'

'I'm foul in the antenna, but I'm all right and can clear myself shortly.'

I did get clear, and tried to move farther aft. Still I couldn't; I was held up somehow. I pulled at my hose and life line to get some slack, and it wouldn't come. Then, looking up, I saw that I was foul round the submarine's little yardarm.

'I guess I can't get any farther aft,' I told the topside. 'I'm foul on the yardarm. But I'll lie down and stretch out as far as I can, and try a tap.'

As it was, I just did reach the engine-room hatch, and sent a few signals, without getting any response. And then I was perfectly assured that there was nobody alive inside the boat excepting the men in the forward torpedo-room.

I got back to the conning tower and climbed it to clear my lines from the yardarm, about seven feet above me. When I came down from the tower, knowing that what they would try next would be to blow the ballast tanks from the topside, I went to the side of the cut-water on the conning tower and opened the hatch there, though without any instructions to do so. There is a hatch on each side of the cut-water, containing the ex-



ternal connections to the ballast tanks and the compartments. These hatches and connections are placed there for this very emergency which had occurred.

I told the topside then that I had completed my inspection and opened the hatch, and what did they want me to do. They answered, 'You've been down long enough. Stand by to come up; we have another man ready to go over.'

This man was Bill Carr, and while I was going up he was coming down; I saw him pass me. He was carrying with him an air hose, to hook onto the external connections, to blow the ballast tanks, and if possible to make her light enough and bring her to the surface. They figured that if the ballast tanks were flooded, it would be through the Kingston valves, and they could also be blown through that opening.

There was a chance that the ballast tanks were not flooded, for she was just at the surface and coming up when she was hit. Her tanks might have been already blown. This would not help, however, if the compartments were all flooded and the ballast tanks dry; she would still be held down.

As soon as Carr had hooked up, the Falcon was moved a little away from the position, in the hope that the boat would come up — and so as to be out of the way of her — and started blowing.

After they had given her all the air they could get together, they blew for half an hour. Then a big eruption of air was seen at the surface — and that attempt was a failure. It was readily seen that one of the tanks must have been ruptured by the collision, so it was use-

less to carry on any further in that respect: there was nothing to be gained, and it wasn't possible to make an external patch on her, except by a long job.

The men in the S-4 didn't signal to Carr at all. I figure they could hear him hitching up to the connection and hear the air going into her. It took him perhaps ten minutes to make his hitch, and it was just an hour and ten minutes from the time we started that the air was going into her. Those men, being experienced, could undoubtedly tell what was happening.

On the topside, as soon as they knew there was life aboard the submarine, they got the oscillator of their submarine signal system overside and sent signals. I think the first signal — they were in Morse — was to ask what the conditions were. The answer was, 'There are six in the torpedo-room with fifteen inches of water and a slow leak.'

This was close to noon on Sunday, for I had gone down about eleven. Carr came up before the Falcon started to blow the tanks, and nothing else could be done until this plan had been tried and found useless.

The next thing to try was to put air into the compartments. This meant taking the gags off the lines at the connections inside the hatch on the cutwater. The diver, instead of taking off the air hose already set on the tank connection, to save time would take down another hose line and set that onto the connection to the compartments.

By this time, it was getting dark, and the sea was getting worse all the time.

Let me say right here that diving has never been at-

tempted before under such desperate conditions as we had, and it never will be tried again unless by a man of the United States Navy. No commercial diver would think of doing it.

Every time you went over the side, it was an attempt at suicide, because of the sudden increase of pressure every time a sea went over you. There was a ten-foot rise and fall of the waves; with one pound pressure to every two feet that meant five pounds additional pressure, suddenly applied and as suddenly taken off again, to the square inch of your body. A man's body is approximately two thousand square inches of surface, and that means five tons of pressure for the five pounds per square inch. It causes intense waves of pain in the ear drums; it may burst them, and it can quite simply kill a man.

It was bitter cold. The seas were by this time coming aboard the Falcon, and the tenders standing along the rail and holding a man's lines, or watching his air or handling his telephone, were hit by the spray and solid water that came over the rail and were rapidly coated with ice.

Before a diver going over the side could get under water, the spray and wind had made him a mass of ice. The cold lets up a little when you actually get under water, but if you have got chilled before that, you never do come back. You stay chilled.

But Captain King said, 'We must get air in there to-night. It's to-night or never.' So they looked round for the best man to send, and decided on Fred Michels. He went down, taking the second hose.



ADMIRAL BRUMBY ANNOUNCES BY HIS HANDS THAT SIX ARE ALIVE



CARR AND EADIE READY TO GO DOWN





When he had been down three quarters of an hour, and they had heard nothing from him for quite a while, they grew anxious. He said he was badly fouled and asked them to send me down. They couldn't understand him very well, but he seemed to be saying, 'Send Eadie. Cutters, Eadie, cutters.'

They came down for me. I was in my bunk; it was about five and a half hours since I had made my dive, and after an hour below, I had been decompressed on board the Falcon, in the chamber. I had got warm, had something to eat, and turned in and gone to sleep.

Captain Hartley, the commanding officer, came down himself and woke me.

'Mike is foul,' said he, 'and it looks kind of bad. Will you go after him?'

'Yes, sir,' I said. 'I'll be up as soon as I can.' And I was in such a hurry that, instead of putting on three suits of underwear, as we usually did in that cold weather, I put on only one.

On the topside I asked for a suit without any gloves, for I knew I should need the freedom of my hands.

The temperature of the water that night was thirty-four degrees, and putting your hands into it was like putting them into freezing brine, and was extremely painful.

By this time, too, the seas were coming well over the rail and giving everybody a good ducking. In fact, they had to put up a canvas shield to make a lee where I could get dressed without getting sopping wet before I even went over the side.

I got into my outfit, and before putting the helmet on

tried the telephone. It wouldn't work. Of course, it had been tested after it was taken off the last man who used it. But apparently it had been capsized by the roll of the ship and some water had slopped into it and put it out of commission. That meant taking off the breastplate — since the breastplates are fitted to the helmets, and won't fit other helmets — and getting another. It also meant more delay for Michels, down below in the dark, before some one could get to him.

They fetched another breastplate and helmet, and the telephone in this one worked all right.

Captain Hartley said, 'We are still talking with Mike, but we can't hear him very well. I can't make it out, but it seems to be cutters, wire cutters, so I'm giving you a heavy pair of wire cutters.'

'All right,' said I, 'but put in a hammer, a chisel, and a small crowbar.' And I put these tools in the bag on top of the wire cutters.

Carr had shifted the descending line when he went down to a cleat forward, clear of the wreckage, so to save time I went down on Michels' own line, carrying a thousand-watt lamp, and landed close by Mike, who was lying in the wreckage on deck, forward of the gun. He never had made his connection at all.

Mike was lying face down in the wreckage, and there were at least eight turns of his lines woven back and forth across his back. There must have been one hundred and fifty to one hundred and seventy-five feet of his hose and life line laid back and forth across that deck. It was caught in the wreckage on one side, and on the

other, on what afterward proved to be a piece of the bow of the Paulding that was sticking in the gash in the hull.

Mike's pickle was due to the storm that was blowing on the surface. The Falcon, lying to an anchor, naturally would yaw. As she went off to one side, Michels' lines would come taut, and the tender had to give him some slack or haul him off the deck of the sub.

When the limit of the yaw came, and the Falcon began to go the other way, the line and hose lying on the bottom promptly became a bight, a long, narrow loop. The tender wouldn't notice any slacking, and even if he did, he couldn't have taken it up much without pulling Mike away from his work.

But when the ship had gone over to the other side, the loop would catch on a piece of wreckage. Again the tender had to give slack while the yaw kept up in that direction; again it changed back, and another bight came sweeping across the bottom, this time to catch in the fragment of the Paulding's bow. As it came across, it just happened to land across Mike's shoulders; had he been six feet forward or aft of where he was, it wouldn't have caught him. But it did, and pressed him down on the deck.

Mike said afterward that he didn't know at all what had happened to him. All he knew was that he was pulled down to the deck. But I think he was pushed down. Anyway, after he was down the yawing went on, and the turns were laid on top of him.

Mike wasn't to blame for getting foul. It was through



no inattention of his. Nor was his tender to blame for his part, in giving the slack. It was the result of conditions on the surface, that's all.

I first tried to clear him. I saw one bight that was caught in an angle iron, down on the side of the boat, that was bent into a U-shape, and I realized that if the line could get into that U it could get out.

So I got down over the side. I couldn't see, even with the light, but I felt down below the angle iron, got hold of the line, braced my foot and pulled. But with all my strength I couldn't get it out.

I wasn't talking to the topside much. I simply told them, 'It's quite a mess here. Don't bother me.'

I saw that if I started anywhere but where I was, I should get the snarl into a worse mess yet. Even the part on which I came down to where it was caught was underneath several other lengths, and it couldn't be freed till they were off. I never saw such a mess.

As soon as I had sized up the situation with the light, I realized that the wire cutters were absolutely useless. They couldn't cut the angle iron. I came to the conclusion that the best way would be to saw through the angle iron, through the bight of the U, and let Michels stand up on his feet. So I telephoned up for a hacksaw, and told them to shackle it onto my light wire; it would come down quicker than as though they sent it on my line, where it might hang up on hose connections. When I got it, I went over to Mike.

I hadn't spoken to him, for the topside had told him I was coming. I was close to him, and he knew I was there; he kept pointing to where he was foul, and I would make

a motion that I understood. He was really only a dim outline in that muddy water.

But I wasn't paying any attention to him whatsoever. I wasn't concerned with him, but with what held him.

Even with these explanations it doesn't take long to tell all this; but I had been down fifteen or twenty minutes. The hacksaw came down very quickly after I asked for it, and I took the light over to Mike, put it in his hand, and put his hand so the light would be in the position where I needed it, and told him to hold it in that position. He was within five or six feet of that U-shaped iron, but he couldn't get over to it. He was so held down that he could not even get his hand to his air-control valve. Had it been shut off — for instance, to telephone — he would have suffocated. That was why they couldn't get his messages very well; he was in a position where he couldn't shut off his air, and you have to shut it off to use the telephone well.

He held my light, but in less than a minute it flared up in my eyes so I couldn't see a thing. He couldn't hold it, but I didn't know that. I got kind of angry, and shook him, and said, 'Hold it there!'

Then it flared again. He had dropped it.

This time I realized that something was wrong with him. He would have helped me if he could. As a matter of fact, he was unconscious; his suit had become cut and was full of that ice-water — and he couldn't move to keep his circulation going.

So then I took the light and put it against the gun mount; Mike was lying in the wreckage forward of the

gun, which is forward of the conning tower at least six feet. And finally I got to work sawing that angle iron.

It was a miserable job. The iron was loose, and I had to hold it with one hand and saw with the other. It was in an awkward place, near the edge of the superstructure, and I had to lie right down by Michels to work, in the wreckage. I had to go slow and carefully, too, for a hacksaw blade is brittle, and, if I broke it, it would cost time to get new blades. And time was the breath of life. I could last only about so long, and Mike could live only about so long.

It took me forty to forty-five minutes to cut through that stout angle iron. Inside the boat they never made a sound; they undoubtedly thought that whatever we were doing was toward their rescue. It was very cold, and my hands were aching terribly.

Finally I got through, but here was a new misery. Lying down to cut it, a sharp angle in the wreckage had cut my own suit, and I was wet to the neck.

The bight I had freed, however, was the end nearest to Mike, and as soon as I had worked the slack back and forth and got some more, I stood him up. I still thought he was conscious, though he didn't help me when I pulled him up. As a matter of fact, he was out — and I didn't know it. I could hardly see him at all; there was a lot of mud.

By this time I was taking the turns out of his lines, and telling the people on the topside to take it in slowly. I thought I had got it all clear, when I noticed a bight leading over the side and another on the port side.

Before I went over the side after it, I put my line and

hose in Mike's hands, for him to hold me. Then I went over the side, and he let me go entirely. So I secured my life line round part of the wreckage, and started in to clear him down there. It was just hung up by the strain and didn't take long to clear.

I telephoned the surface. 'Take in the slack on his life line and hose,' I told them, 'and tell Mike to follow me to the descending line.'

As I was going along toward the descending line, I felt myself becoming buoyant.

'Stop pulling me up,' said I.

'We aren't pulling you,' they answered, and I turned round quick and saw Mike's feet floating about level with my face plate. I grabbed them and pulled him down.

It was found afterward that one of us had taken a turn in the other's life line, and his buoyancy was pulling me off the deck. But at the moment, I merely tripped his spitcock to relieve his buoyancy. Then, realizing what must have caused it, I pulled down the lines till I saw the turn and passed him under the lines to clear him.

Even then I didn't realize that he was out. I simply wondered why he didn't work with me.

I closed his spitcock again; then I motioned to him to come toward the descending line, and held the light behind me to show him the way. In a moment I looked round, and again I couldn't find him.

'Where's Mike?' I called on the telephone.

They said, 'He's all right.' The reason they knew he was all right was that they now had all of his line except



just enough to reach to the bottom, so they knew I had him clear.

We didn't know how bad things were. The Falcon had begun to drag anchor in the gale. She was drifting so badly that she had dragged her anchors four hundred and fifty feet, even though two other ships had their moorings out and had their lines on the Falcon trying to hold her up in position. The Falcon has anchors one thousand pounds heavier than ships of a like size — so you can see it was blowing some on the top-side.

It meant that Mike and I were at the extreme end of our lines. Captain Hartley figured that in five to twenty minutes longer, if I hadn't got Mike clear, we should undoubtedly both have been left there. So time was even more precious than we had any idea.

When I got to the descending line and didn't see Mike, I told them on top that I couldn't.

'All right,' they said, 'stand by to come up.'

'All right, haul me up — I'm wet to the neck,' said I.

They would have hauled me anyway. Under the conditions and with the ship drifting they couldn't have me taking my decompression in the water.

I was still carrying the light, and when I got to the surface the light of it showed Michels lying blown up, on the surface!

They didn't know he was on the surface. And that's how he reached the surface before me, and I got into the tank ahead of him!

They got the stage over, and got me aboard and rushed me into the tank. There were already three other

men in there, waiting for us, to take care of us. The three of them took my suit off. They were still at it when Mike was passed in. It was just the same as you'd pass in a broom; he was as stiff as a board.

His eyes were rolled up into his head; he was frothing at the mouth and making a gurgling sound, and we had to cut his clothes off him, diving suit, underwear, and all. He had a pair of woolen gloves on, and, even though we cut them, his fists were clinched so tight that it took all the strength of two men to open his hands and make him let go of them.

According to the decompression tables, we should have been under a pressure of thirty pounds, but when I saw his condition I ordered the pressure run up to sixty pounds to relieve the 'bends' — for it looked as if he might have a serious case of them, on top of the exposure. However, he didn't; it turned out to be only a bad case of exposure.

They took an hour to run the pressure down to thirty again. I said to the other fellows, 'Men, you've got to work,' for it looked as though we'd lost him after we thought we'd saved him. The three men and I massaged his body, slapped his face, and in general gave him a beating.

Cold as I was myself, I never felt it until I noticed that Mike was apparently coming round. Then I began to shiver. I lay down right into Mike, both of us naked and under blankets, to share the heat of our bodies.

It was 11.40 when we entered the tank; it wasn't until 3.30 that Mike regained consciousness and could recognize any one. The first man he recognized was Lieu-

tenant-Commander Ellsberg, who had just come in. He had volunteered his services and had just arrived on the job. And ten minutes later we got down to atmospheric pressure.

I left then, and went down, turned in, and slept. They kept Mike in the tank. In the morning he sent for me and told me what he could remember. He could remember very little, and only for a short time after I came down. He had put his hand out for the hacksaw, he said, because he had the idea I wasn't working fast enough and he wanted to help. Well, he'd have gone at it so bull-headed he'd have lost time.

He was still very weak in the morning, and it was thought that to save his life he ought to be taken to a hospital. The only safe way to get him there was in a decompression chamber, and as the Falcon was the only ship that had a decompression chamber, she had to be used. That was the reason she left the scene, and I think it was a thing worth while doing; it saved Mike's life, and the conditions at the wreck were so bad that diving was impossible. This was Monday morning, and we had one more signal from the submarine before the Falcon left.

All through the storm, the only line the Falcon had on the submarine was the descending line. As the ship yawed or dragged, this line had to be tended by hand. Before the Falcon left for Boston, she buoyed the line and let it go. This was the buoy that carried away and lost the S-4's position for us.

The Falcon transferred Michels at the navy yard at Charlestown to an ambulance from the Naval Hospital,

and stayed only long enough to take aboard supplies that were urgently needed, and that had been ordered to the wharf by radio. I managed to get out on the pier and find a telegraph messenger, and I sent Mrs. Michels a telegram to say that Michels was taken to the hospital as a precaution, that he was perfectly all right, and that she was not to worry.



## CHAPTER XI

### A WINTER SALVAGE JOB

WITH Fred Michels safely ashore, I went back to Provincetown with the Falcon. This was the trip that was so much criticized at the time by people whose imaginations had been seized by the picture of those men shut up below, suffocating gradually, while their only possible rescuer was gone to Boston. Those people couldn't be blamed for their feelings, but they simply didn't know the actual conditions and didn't know that nothing could be done while the storm lasted.

While I am talking about criticisms, I may as well explain why reporters were not at first allowed to board the Falcon. There literally wasn't room. Her complement was sixty-two men; she had aboard one hundred and forty-six, counting the divers, tenders, and her own crew.

It was still very bad weather. This was Monday, it will be remembered. The storm had been steadily getting worse ever since Saturday night; it reached its height on Tuesday.

I judge there were twenty to thirty civilians clamoring to get aboard. They were warned away from the ship for the simple reason that any power boat near the ship is a menace to any diver who is down. Now Carr was over, Michels was over, and I was over, one of us at a time, and the red flag was flying to warn power boats to stay so far clear. They paid no heed, and were so close



TOM EADIE, WILLIAM CARR, FRED MICHELS, AND CAPTAIN  
HARTLEY OF THE FALCON



in that they were a menace to the man who was down. The officers realized this, and ordered them off.

Later, word was got to the reporters to form a committee of their own, and that this committee could live aboard. This was done, though for every reporter that got a bunk some man of the crew had to give his up.

I didn't blame the reporters. They were sent to get the story. When they couldn't get it first-hand, they couldn't write back to their papers and say they couldn't. So instead they condemned the men who stopped them.

We read those newspaper articles out on the job, and we couldn't even recognize from them the job we were on. Carr said, 'Gee, Tom, from now on I won't even believe the baseball scores!'

Even after the committee was assigned, it was hard to treat them right. But those who were assigned proved themselves to be real men, and there was nothing that they wanted to see or know about that officer or man wouldn't explain to them. They ate and slept with us, had the freedom of the ship, and saw everything that was going on.

We did feel badly, though, to see those stories, knowing what we ourselves were putting into it and realizing as nobody else could the conditions we were fighting against.

On Tuesday we lay near the wreck, but we couldn't see much in the storm. The marking buoy was seen late in the day, and was gone on Wednesday morning, so we figured it must have been carried away during Tuesday night.



Tuesday a long conference was held on the question of getting food, soda lime, fresh water, and oxygen into the submarine. The only possible way into the torpedo-room, where the six men were, seemed to be through the torpedo tubes, and it was decided to pack the stuff in inner tubes and to use enough of them to fill the torpedo tube pretty snug. This was so that when the men opened the tube inside, to take in the supplies, there would be less water get in. We had tested the water cans, to see whether they would stand the pressure; we found they would if absolutely filled with water. If they were half full, the pressure crushed them. We got the package all ready, and the divers were standing by ready to go down at the first possible moment.

The sea was rising at sunup, and as it came full light we saw that the buoy was gone. Working boats from the Falcon and the coast guard immediately started sweeping for the sub; only a small area had to be covered, but the water is very deceiving. However, the boats soon got the S-4 again.

As soon as the submarine was located, of course its position was known. They put a descending line on it; life had ceased to exist aboard, however. We didn't know it, but the officers did. Nevertheless, we went ahead on the possibility that there was a chance.

They had never hooked onto the main salvage line, as the tube to the various compartments was called. Michels had tried to do it, but was fouled and then forced away from it. The submarine that was lying near by had signaled to the people inside the submarine to take out the gags from the inner end of the sal-

vage main; they replied that they had done so, and got water.

This led us to believe that the line was ruptured. The same thing had happened on the S-51, so we were not surprised. But after we got the S-4 to the navy yard it was found that this line was intact — the water that had come through was merely condensation.

My own idea is that as soon as they saw that water coming in, with fifteen inches already on the floor, they said, 'Well, here's one leak we can stop anyway,' and shoved the gag back before the condensation water had all run out.

Anyway, the belief in the break caused us to try another way of getting air in there. We got a message about this time from a submarine away out on the Pacific Coast. Her skipper sent a message, 'Try the S.C. tube.'

This S.C. tube is a listening device. A T-shaped tube stands up out of the forward deck, and at the ends of the arms are rubber balls which are over the ends of small copper tubing inside the S.C. tube, and act as diaphragms. The stem of the T goes down through the deck, and is stopped at the lower end by a flapper valve. If the listening gear is in place, it pushes this flapper valve up. On the off chance that it might be up, and that air could be forced in through the small copper tube, and foul air could be vented through the S.C. tube, the divers were set to work.

Carr first went down and unhooked one sound ball, putting on a short length of hose with a valve in it to keep water from going in. On its outer end was

a connection, and the line to the deck was connected there.

As soon as Carr had the line hooked up, air was put on, and went into the torpedo-room. It was working. Now there was little possibility that anybody in there still lived, yet there was just a chance that one or more of the six might still be breathing, though unconscious, and that fresh air would revive them.

So Wilson and Eiben went down and took off the other sound ball, to vent the foul air. I was next down, and went down at 11.40. For though we had all worked furiously, what we had done took a long time. Finding the sub, getting the Falcon in position over her, putting Carr down for an hour, and Wilson and Eiben for an hour, had eaten up the hours.

On the deck of the Falcon, no two men spoke without discussing the chances or trying to make suggestions what to do. We were all like dogs on a leash, just aching to get somewhere. Admiral Brumby, I think, felt the worst of all; for five days that fellow never took his clothes off.

When I went down, I hooked up the tube that Wilson and Eiben had cleared, and opened the valve. Carr had brought up word that he had seen a man stuck in the mud forward, alongside the submarine. He said he could see the man's finger nails shining. We wanted to see if anybody had tried to blow himself out through the torpedo tube, and I went to look. It was only some little shining shells.

Then I measured the distance from the bow to the bottom, finding eighteen feet on the starboard side and

fifteen on the port side. The object was to see whether the torpedo tubes were clear of the mud, and I reported that they probably were. Scott, who went down after me, inspected them and found that all four tubes were clear.

I think Admiral Brumby's first refusal to have the reporters aboard was just that he had so much on his mind — nobody was thinking much about the public just then. There he was, the boss of the job, and taking advice from the experts, doing whatever their experience suggested. He never said, 'You must do this thing this way.' He was right, too. If you had to be boss of a job and to know all about it and all about doing it, what a load you'd have to carry! The successful man is the man who can surround himself with an organization that knows its job.

Admiral Brumby had Captain King, Captain Hartley, and Lieutenant-Commander Ellsberg. Tibbals, the man who had charge of the divers on the S-51 and who later took charge of them on the S-4, hadn't then arrived, but his part of the job was being carried on by another man just as well.

The Department was rushing us every diver and every man it could find who knew anything about the job, and the gear required was rushed to us as fast as it was demanded. And the Merritt-Chapman derricks Century and Colossus were standing by in Provincetown Harbor.

All sorts of schemes for hauling the S-4 were suggested. But none of the people who suggested them realized what the suction holding her was. It figures at four tons a square foot — in the case of the S-4, four



thousand tons altogether. For though she had ten thousand square feet in the mud, the absolute suction is figured only on that part which is the real bottom of her.

It was because of this enormous suction power of the mud that it was planned to raise the S-4 one end at a time. If one end could be lifted clear of the mud, the water would cut in and release the suction, cutting down the actual lift to the weight of the submarine alone. The submarine weighed 710 tons dead weight, outside of the allowance for suction. The derricks had a maximum lift of 230 tons. This was the answer to the often-repeated insistence that the derricks ought to be put on to her — if she only had ‘pad-eyes’ — and haul her to the surface.

On Thursday the work of salvage began. Two divers went to inspect conditions forward; I myself went to look at the diving rudders and the steering rudder, to find out how deep she was settled into the mud.

I found the steering rudder set fifteen or twenty degrees to starboard. The bottom of the steering rudder was in the mud, but the propeller and the shaft were clear. I made fast also a descending line aft of the engine-room hatch, to a cleat on the port side, leaving end enough to reach to the bottom. This was to help a diver climb down from the deck to the bottom.

Eiben was the next man down, also for inspection. And then Lieutenant-Commander Ellsberg himself went down and inspected to check up on the reports of all the other divers. This was the dive when he got stuck in the mud. He was standing forward, and a surge of the Falcon, overhead, pulled him off his feet and sent

him sliding down over the side. He caught at the edge of the hole made by the Paulding, and cut his glove. Then he let go altogether and fell into the mud, which closed over him. Though he was a novice at diving — he had learned it during the previous winter, but had made very few actual dives — he kept his head, closed his escape valve, and let his buoyancy bring him up clear of the mud.

The programme which had been so painfully acquired in the S-51 job was started all over again here, though the winter was far advanced, and the cold was making the job not only bitterly painful, but also was stopping it when the storms came along.

Carr was the first diver down to start tunneling under the S-4, forward. He was followed by Scott and Campbell, for it was discovered that the new self-propelling nozzle had a trick of boring ahead on its own hook, and, as the stiff current which prevailed at all times on this job added a pull, two men were used thereafter on the hosing job. Scott and Campbell reported that they had reached the keel.

The newspapers had made a good deal of my rescue of Michels, and now batches of letters began to reach me on the job, many of them from people I didn't know. One of the unusual ones was as follows:

*'Dear Sirs and Divers — Enclosed find a badge of the Sacred Heart. Slip it into the submarine, it might be of great help; who knows? All our hearts are full of sympathy, but this is the greatest heart of all. There may be some among you who understand the love in the Sacred Heart. Have faith and try it. Sympathizer.'*

It wasn't possible to slip it into the submarine, but I asked the reporters to have the newspapers announce that I would put it, on my next dive, on the periscope; then, when the submarine was raised, it would be the first thing to break water.

It happened that my next job didn't take me near the periscopes, but I put it on the S.C. tube. I thought there was a lot of sentiment in putting it there, because the S.C. tube had been our last hope of saving the lives of the men in the boat.

Crilley followed in his turn. He had a minor accident, for his exhaust valve clogged. His suit inflated, and he was blown to the surface, but his condition was in no way serious, and nothing like what the first printed reports gave.

Mattox also had an accident, and, though not so spectacular on the surface, it was really pretty bad. Only expert care kept him from having a very bad case. His suit was cut and got full of water, but he stayed on the job until he finished it, and then came up in pretty bad shape.

The first tunnel was done, and done very quickly, and Davis, the next diver down, was given the job to reeve lines through and see them clear. Ingram started the second tunnel, some ten or twelve feet abaft the first one.

We were practically following the procedure established on the S-51 in 1925, though because the S-4 had greater possibility of buoyancy within herself, we planned to use only six pontoons instead of eight.

The bottom at Provincetown was so much softer than

that off Block Island, as shown by the speed at which the tunneling was done, that we now tried another trick. Wilson and I, who were next down, put a line under the bow, and tried to sweep it aft and save the need of digging tunnels. But it didn't work; the mud was soft, but not soft enough for that. It was soft enough so that it filled up a tunnel about as fast as you could dig it. Below the surface of the mud, it was like slush. If you sank up to your waist, and then tried to get out by treading, pulling up one foot after the other, you would only be making use of the suction to pull yourself deeper and deeper.

The men on the topside couldn't pull you out. Your lines wouldn't stand the strain — for, after all, the life line is practically only a braided jacket, hollow, through which runs the telephone wire,

Really the only way to get yourself out of the mud if you are badly sunk is to sway back and forth, and each time a little more, rolling your body round in a circle, until you have opened a cone of water down to your feet. Then you can inflate your suit a little and step out.

Carr went down and renewed the line to the S.C. tube, for it had carried away. Some idea of the difficulty a diver has may be had from the fact that that one job used up all the time it was safe for him to stay down. An hour is about the limit, unless it is the only dive the man expects to take for several days — and this was in one hundred feet of water. In the greater depth on the S-51 job, of course, the safety limit is shorter.

It takes some time, from the time you leave the deck, to get down. It takes some time on the bottom to get



all set, adjusting valves, getting your eyes used to the light, and seeing your lines are right. It takes considerable time, sometimes, to get to where you are to work.

You can't work as fast as on the surface; fumbling for tools in gloves, and the extra care you must take not to drop and lose them, slows you. So sometimes it is a wonder the diver accomplishes as much as he does.

The last men down that day were Kelly and Wickwire, who worked on washing the second tunnel. It may be said here that first and last we had on this job some sixty men who have been referred to as divers; the figure includes divers, tenders, and 'bears,' as the men who help the divers to get into their suits are called. Half a dozen men at first did practically all the actual diving, but as time went on more and more men were used, some of them for only one dive apiece.

These divers were all in charge of C. L. Tibbals, the chief gunner who had supervised the work on the S-51. The engineer who planned the work was Lieutenant-Commander Edward Ellsberg, retired, who had volunteered his services. The Falcon, as before, was in command of Captain Henry Hartley, and the whole job of salvage was in charge of Captain Ernest J. King.

When the job changed definitely from possible rescue to a salvage job, Commander Ellsberg went back to his own business. Commander Harold E. Saunders, the naval constructor, came down from the Portsmouth Yard, where he was stationed, to take over the work Ellsberg had done on the S-51 job.

Commander Saunders knew submarines better, perhaps, than any other man in the Navy. As a naval con-

structor, he had been building them, and for the work in hand he was splendidly capable.

In simple terms, our job was this: We first had to flood the torpedo-room where the six men had died, in order to preserve their bodies from decomposition. Next, we had to seal up the submarine airtight — excepting, of course, the battery-room where the gash was — and pump her full of air, to get all possible buoyancy. Next we had to put chains under her and sink pontoons, attach these chains short to them, and blow the air out of them. With their lifting power and the buoyancy we hoped to get into the S-4 herself, it was figured that she would rise to the top.

December 24, it blew up rough again, and we couldn't work. It was just one week since the disaster, and in that time we had had three days when we could work. We had been down on the Sunday, but that was a desperate emergency occasion and was a suicidal thing to do.

It may be said here that we got the S-4 up in just fourteen minutes less than ninety days from the time she sank, and that in these ninety days there were just fifty-six on which it was possible to dive. In those fifty-six days approximately five hundred and seventy dives were made.

On the S-51 job fully fifteen hundred dives must have been made. So it may be seen that the task as laid out was not so simple as it sounds.

Admiral Hughes and Secretary Wilbur came to Provincetown and aboard the Falcon on that Christmas Eve for a conference on the work. I was called into the

wardroom and both of them congratulated me on my getting Fred Michels out of his fix. Secretary Wilbur told me that 'further recognition of the deed' would be made. He had evidently been told about it in detail by Captain King and Captain Hartley.

The conference was on the point whether to quit the job for the term of bad weather, as we had done in the case of the S-51. We — I mean the divers — really thought there was no further use in carrying on a salvage job that could as well or better be done in the spring. Of course, the great suffering for us that was involved in carrying on may have had something to do with our holding that opinion.

The officers decided to carry on until forced by the elements to quit. There seemed to be two reasons for this: in the first place, a great deal of public feeling had been aroused, and it was mostly that the Navy wasn't standing up to the job. In the second place, Provincetown was really a more sheltered place than Block Island.

Christmas Day it was still very rough. It was a tough Christmas, when we sat around and thought of what we had planned, each man by himself, to do on that day at home. On the job, it was just another day.

On December 26, it was possible to work again, or rather to get ready to work. After every storm all lines from the submarine to the surface are found snarled up in a mess, and Eiben went down to clear them up.

I was the next man down, and my task was to cut away the submarine's antenna and the clearing wires — the wires that run from the nose of a sub to the top

of the conning tower, to carry anything she might hit under water up and over her. And when I say 'wire,' I mean in this case a wire rope made of some seven strands.

All this stuff was sent up to the surface to get it out of the way. It was all cut and sent up because it had been a standing menace to the men working, threatening to foul them every minute.

We had a special trick for cutting wire. A line was lowered to us with a hook on the lower end. The hook was a V-shape, and the line fast to one side of the top; the inner edges of the V were sharp. We made a light line fast just above the hook, hooked the hook under the wire, and stood clear so that the flying hook or wire shouldn't hit us. Then we telephoned to the surface that we were ready, and they hoisted away on the hook until it cut right through the wire. Of course, if you heave short, and the Falcon drops in a sea, you can get some more slack; on the next upward surge you have the whole buoyancy of the ship pulling against that hook, and something has got to give.

The light line was used so that when the wire gave and the hook flew up, we shouldn't lose it, but could haul it down and hook on somewhere else.

I couldn't do all the work in the time I had at the bottom. Crilley, who followed me, took it up where I left off.

On December 27, it was found that the work was so much of a strain that it was decided to work only on day work. On the S-51, we had done work night and day, but here the conditions were far worse, and we were



carrying on in weather that on the S-51 had caused us to quit altogether until spring.

Carr put down a new descending line, to take the place of one that had carried away, and he also moved the old one to a better position. Mattox and I were the next down, and we started washing a tunnel for the second set of pontoons. Davis and Ingram had gone down to start this, but Ingram's suit was cut and flooded before they got to work, and they had to come up.

While Mattox and I were starting our tunnel, Kelly and Wickwire were running lines for the after chain of the sternmost set of pontoons. The stern was clear of the mud, and all they had to do was to reeve their line under the submarine, but over the shaft.

Campbell and Baker followed us on the tunnel, and Burd and Crilley were to have followed them. But the sea began to kick up, and the Falcon had to slip her moorings, so that Burd and Crilley never got over the side.

The ship got back on the moorings over the S-4 next morning, December 28. Four teams of divers worked on that one tunnel, one team after another, and Mattox and I, the fourth team, got to the keel. Burd and Crilley started; Wilson and Eiben followed them, and Grube and Scott were next. Nothing can better show what a task the tunneling was at Provincetown.

Campbell and Baker were the next team. Campbell washed out a chamber beyond and below the keel so that, when the tunnel coming down from the other side caved in, there would be a hole to accommodate the

stuff, and the starboard tunnel wouldn't be plugged up again.

Kelly and Carr started the tunnel on the port side, but it got rough again, and the same old thing — had to slip the moorings and get away.

Next day, the 29th, Burd and Crilley led off in the port-side tunnel; Ingram and Eiben followed them, and the third team was Scott and Grube. Carr and Kelly were getting ready, when we got a radio warning of a storm of 'marked intensity' on its way, and had to slip moorings and go right into the harbor.

December 30 started in very foggy. We got a pontoon alongside, and had a little drill in lowering it and blowing it up. These operations demand the work of a big gang, and, if all hands know beforehand exactly what to do and in what order, the task can be made more successful, quicker, and easier.

The pontoons had been improved in construction since the S-51 job. Then they had two compartments; the new ones were in three, and this made them work much better, and made our task easier. They didn't up-end when flooded, as the old ones did.

The fog finally lifted a little, and the Falcon went back to the moorings. Carr and Kelly went down and started washing the tunnel again; Mattox and I followed them, and we washed until I was right under the keel.

Then I had to stop to help Mattox. His self-propelling nozzle was boring right down into the mud and dragging him with it. He was helpless, for he had a turn in his lines round the hose — this was what was dragging him.

I got enough slack in his line to get him on the deck of the boat, and then cleared his lines and got the hose out of the mud.

Campbell and Eiben followed us; then Crilley and Burd, and finally Ingram and Baker, and they got the line through under the submarine.

The next day was New Year's Eve. It was very foggy again, but it was decided to try to dive. Crilley and Burd were the first down, their job being to clear the deck round the engine-room hatch. The time had come to get inside the S-4.

Carr and Bedford followed. They had been down only a short time when trouble developed, and Carr had to go to Bedford's assistance. He finally sent Bedford to the stage, and then went on with his work. Bedford came up bleeding from the mouth and nose, and didn't dive again.

Deep-water work affects many men this way, and it will make any diver bleed if he goes down when he is suffering from a cold. The membranes seem to rupture more easily then.

When we came to pry the grating off the engine-room hatch, one of the strongest traits in human nature developed. The grating is of wood and is set in pitch. We took a crowbar to it, and naturally split the grating into kindlings. The bits of wood floated to the surface, of course, and then there was a grand scramble for the pieces — the first 'souvenirs' of the submarine.

Of course, some of the men on the Falcon had cut bits off the clearing line and the antenna when they came up, but these broken bits of wood were picked up by visitors

hanging round in small boats. I afterward saw some of them; they had been carved into miniature submarines, or had been made into cribbage boards, and the like of that.

Well, divers are like other people. They all seem to want souvenirs of the jobs they have worked on. And I'm just as bad as the other divers.

When we were off Point Judith, working on the S-51, I figured that I wanted a souvenir. I got one; it is a valve wheel. The way it happened was this: I was sent to open a certain valve, and in the dark I came to this one. I couldn't tell, because I couldn't see, whether it was the right one or not. But I knew how to find out. I opened it, working entirely by feeling, and then I unset the nut and took the wheel off and brought it up with me, for every valve wheel is marked to tell what valve it is on.

When I got to the topside, I found it was the right valve that I had opened. So I asked if I might keep the valve wheel for a souvenir.

The big souvenir of any ship is the ship's bell. It's a showy thing, to begin with, for the bell metal takes a fine polish. Then, too, it has the ship's name cast on it. Besides all that, it has a sentimental meaning; it is the ship's voice, you might say. And you can ring it.

One day on the S-51 job, we got to talking about souvenirs round the mess table, after we had finished supper. Somebody wondered whether we could salvage the 51's bell, and I noticed that nobody seemed to want to talk very much about it.

In a minute, I got the idea, and then it was funny.



You could see by the look in every man's eye, or by the way he would hang his head down to hide that look, that practically every one of the divers meant to get that bell for himself.

Sometimes the ship's bell on a submarine is hung on a bracket on the forward deck. On some boats it is aft. On the S-51 it was forward. I hadn't paid any particular attention to the bell before this discussion, but shortly afterward, when I was down on a dive, I noticed that it was already missing.

That night I said to Bill Carr, 'Well, Bill, the bell's gone. Somebody didn't waste any time.'

'No, it isn't,' says Bill. 'I saw it myself this afternoon when I was down.'

Well, I thought possibly I had been looking in the wrong place, though I thought I remembered seeing the bracket for it. Anyway, I made up my mind to look next day.

This time I made good and sure it was gone. It happened again that Bill Carr followed me, in the order of diving, so I didn't see him till night.

'I looked for the bell again to-day, Bill,' said I. 'You were away off; the bell has been jingled out of there.'

'You're blind,' said Bill. 'I saw it to-day when I was down, as plain as I can see you now. I had my hand on it.'

'Where did you see it?'

'On deck, forward.'

'Standing down on the deck?'

'No, on the bracket, where it always was,' said Bill. He was so positive that I checked up once more, next

day. No bell. And that night here was Bill Carr insisting that he had seen it again. It would have been mysterious, only I was able to figure what was happening.

Somebody was juggling it. He meant to grab it off for himself, and he was somebody in the team of divers just ahead of me. He was afraid I would get it, or the fellow that went down with me. So every day, before he came up, he would unset it and hide it somewhere. There were plenty of places where he could hang it over the side, or tuck it into a corner, and except by pure accident, nobody would be likely to run across it. Then he would have it fixed with some other fellow to get it and put it back, because, if too many noticed that it was missing, questions would be asked, and it would be traced to him.

I didn't say anything, though I had a pretty good idea who the fellow must be that was jiggering it around so. But it went along until we were getting fairly near the end of the job. Then the fellow I thought it was told me.

He and I were going down on a job together, and this fellow — Smith his name was — told me he had taken it, and that he meant to get it up. He said he had it fixed with somebody on the topside, that he would bring the bell along when he came up, and put it on the stage where we took our decompression.

When the stage was at the forty-foot depth, this fellow on the topside would have a line ready. Smith would hook on the bell and signal, and then the other man would pass his line along the side of the Falcon and

round her stern, and get it where he could haul the bell aboard without anybody's noticing it.

Sure enough, the bell was missing again when we got down. But when we had finished what we came for, Smith went and got it, and I helped him to sling it and make it fast to his belt. He couldn't carry it any other way, for you need both hands when you are going up, to handle your control and exhaust valves.

We got onto the stage all right and unslung the bell. We sent it down between his feet — and then, blooey went his fine scheme!

We didn't know it, but it was coming on to blow, on the surface. The sea was kicking up so fast that the Falcon was getting ready to run in under Point Judith, and had no time to gossip out there. They just plumb hauled us to the surface, stage and all, and bell and all. Nothing to it!

Of course, we were rushed away right off into the decompression chamber. When we got out of our gear and were stretched out and lying good and warm with a couple of other divers who were in ahead of us, I couldn't very well say anything, but I did grin at Smith. He wouldn't grin back; he was too mad.

After a while, when I was talking with somebody on deck over the telephone, I asked what had become of the bell. The fellow said Commander Ellsberg had got it, and taken it into the wardroom.

'What did he say?' Smith asked, and I told him.

He boiled over. 'Here, let me at that telephone,' he said, and he called up the wardroom to protest. Apparently Ellsberg came on the telephone, and they had

quite a chat. Smith stuck to it that he was entitled to the bell, and after a while they gave up talking, and Commander Ellsberg came into the chamber. And then they did go at it!

What Smith said was enough to have got him a court-martial. Reduced to what can be told outside of a decompression chamber, it amounted to this: Smith claimed that he found the bell, he brought it up, and he was entitled to it. Commander Ellsberg insisted that he had no more right to the bell than to anything else aboard the submarine; it was all Government property. Then, of course, Smith wanted to know why Ellsberg thought he could take it, if Smith couldn't.

They were so earnest about it that I tried to butt in. I was embarrassed hearing them, and I was afraid that Smith might get himself in Dutch. On salvage jobs a good deal of the formality between officers and men disappears, but there is a place where discipline must step in. I tried to turn the talk into a lighter vein, but they wouldn't have it. Neither one of them would make any agreement as to what he would do with the bell if he got it.

Finally, however, Smith said that he wanted it only for the School of Mines at Pittsburgh — of all places!

In the end the bell of the S-51 finally did land at the School of Mines. I believe it is there now.

Probably nobody would believe me if I said that I wasn't trying to get the S-4's bell for myself when I found it. That is the fact, though; the bell wasn't on its bracket, and everybody thought it had been carried away by the collision.



I found it myself. It had been mounted on a bracket, forward, and I came across it hanging over the starboard side. The whole top of it had been broken out. Whether this had been done by the Paulding's ploughing over the submarine's deck when she ran down the S-4, or whether somebody trying to pry the bell off had broken it, I never knew.

Anyway, where it was it was likely to fall off and bury itself in the mud. So I rove a light line through the hole and slung it on my arm. The bell weighed about fifty pounds, and was about as big as a good-sized flower-pot. But it is easier to carry weight at one hundred feet deep than on the surface.

I didn't make the least attempt to get that bell for myself. As soon as I got aboard, I turned it over to Captain Hartley, who was in command of the Falcon. He took it into the wardroom, and I understand that later it was sent away to have a new top welded into it. I never heard what became of it after that.

The Falcon had one of the brass name plates from over a compartment door of the S-4 up in her wardroom for a time. But her officers didn't like it, and I believe they intend to take it down again.

I don't blame them. Souvenirs of victory — like a cane made out of the keel of the old Kearsarge — I can understand. But souvenirs of a terrible tragedy can only remind you of the fate of the men. I don't even want my valve wheel now.



CAPTAIN HARTLEY OF THE FALCON AND TOM EADIE WITH THE  
SHIP'S BELL OF THE S-4



TOM EADIE WITH THE HAMMER USED BY THE TRAPPED MEN  
OF THE S-4 FOR SIGNALLING



VALVE HANDLE OF BATTERY VENTILATOR OF THE S-4  
If this valve could have been closed, there would have been no loss of life



## CHAPTER XII

### THE S-4'S DEAD

WHEN the grating was off the engine-room hatch, Campbell and Baker went down to back off the nuts on the hatch itself. They got them off, and then drove the stem of a strong-back into the boat.

A strong-back is a stout bar made like an old-fashioned clamp to go over a preserve jar — and for exactly the same purpose. Its stem goes through a hatch and through the middle of the stout bar. The ends of the bar go over the edges of the hatch coaming, and grip there. Then a nut is turned up on the stem, which is threaded, so that it pulls the hatch down tight on its gasket. When air pressure is put into the boat to float it, the strong-back will keep the hatch from blowing off.

Kelly and I went down next; my job was to take the grating off the motor-room hatch, the next hatch aft from the engine-room. I got it off in two lumps, and threw it over the side. There were no souvenirs from that hatch, for it had a heavy brass edge, and stayed down. And that, so far as I was concerned, was the close of the year 1927 on the S-4.

The next day was some happy New Year! It was very rough on the water, and we had to leave the scene altogether and go into the inner harbor. We had already been having trouble with our air freezing up, but had been going on in the face of it — and, as I know myself, it is not only a trouble, but a very real danger.



In the harbor, we put a helmet onto an empty suit — we used to call that diver Jake, or the dummy. We would put it over the side, weighted enough to hold it under water, and watch the bubbles. They would run for a while, and then stop as the frost got round the needle valve. Then they'd start again, stop, start, and stop entirely — and up would come Jake. We hauled him aboard, cleared his hose, and tried again — and he promptly froze again.

On January 2, it was still very rough. We put Jake over the side again, and he froze his air promptly. Then the divers were set to work hooking up the new telephones which we had just received. They are the invention of Mr. Troici, and showed a great improvement over the old telephones. Regardless of getting wet on the line or in the connections, you can still hear with them — and they are batteryless telephones.

Next day it was still rough, and overside the dummy froze its air again. Congressman La Guardia came aboard to see first-hand what equipment we had and what work had been done. We believed that he had been listening to sensational reports of lack of equipment and failure to do our best on the job.

January 4 was a pretty fair day. Jake's air froze, but it was decided to try to dive. So Applegate was the first man down, with orders to open the engine-room hatch if he reached it without anything happening to his air. Everything went all right, and he got the hatch open.

Then began the sad and unpleasant task of removing the bodies of the S-4's crew. Wilson, Eiben, and Mattox went down, Mattox staying on the deck of the sub and

the others going inside the engine-room to pass up the bodies. As fast as they came, Mattox secured them to a line.

There were forty men aboard the S-4 — her complement of thirty-eight and two men of a trial board who were there as observers.

Thirty-two bodies were taken out of the submarine; two others were not found until after she got into drydock. Six bodies, in the torpedo-room, had to be left there until the submarine was docked; seventeen were taken from the engine-room, and fifteen from the motor-room. There were none in the C.O.C.

The divers found three men right at the foot of the engine-room ladder; two of them were officers, and the third a chief machinist's mate. It looked as if they had been the last to leave the C.O.C., the control room of the boat.

We knew that they had put up a fight before they left the C.O.C., for when they left that they left all possible control of their boat. The broken ventilator and the clogged valve set the flood pouring in on them from the ruptured battery-room. We saw where they had tried to shield the switchboard, which was right under that cascade of death, by putting a blanket over it. But it probably didn't succeed; the switchboard must have short-circuited in a great sheet of flame. Later we found mute testimony that it had done so.

That probably was the end. In the darkness, the commanding officer must have ordered his men into the engine-room, going last himself.

Campbell, Crilley, and Baker went down next.

Campbell went into the engine-room, but saw no more bodies at the foot of the hatch, so he started to open the C.O.C. door. His belt carried away just then, and he had to come up, the other men coming with him. It was just as well, for the sea was getting rough again very fast. No more divers could go down that day.

It blew hard during the night, and in the morning it was far too bad to dive. We tested out the new diving lamp, but it was too powerful; the Falcon couldn't develop enough current to carry it. We took it over and left it on the Bushnell, to be tested out there.

It was still a high and tumbling sea next morning, January 6, but smoothed out in the afternoon, and we went out to the scene again. Ingram, Scott, and McNulty were the first men to go down. Ingram got aft in the engine-room passageway, and found two bodies, which he passed out to the others.

Kelly, Wickwire, and Burd followed. They got out the canvas windsail which had been lying between the engines, and also found two bodies. By this time the sun was low and the sea was kicking up again pretty bad. We had to leave our moorings for the day.

Next day, January 7, Carr, Applegate, and I were the first team to go down. I went into the engine-room; Carr was to stand by at the foot of the ladder, to receive the bodies from me and pass them along to Applegate, who stayed on deck and tended us.

The first one I found I brought forward to Carr. He bent the line on, but couldn't get it up through the hatch, and had to go on deck to help Applegate with it. I knew nothing of this trouble, for I had turned back

into the passageway between the engines, and found two more bodies.

It was strange to take those dead men along the passage between the engines. I had found two of them lying cuddled together, and I have always figured they were buddies who simply clung together at the last. One man we found with half a raw potato clutched in his hand, and one more with half a potato in his pocket. We suppose that they had gnawed at them to ease the irritation caused by chlorine gas in their throats.

Only one man was in a bunk; the others were all on the floor. The man in the bunk was badly burned on his face; we thought he must have been the man at the switchboard when it short-circuited. His mates had evidently got him into the bunk and done what they could for him.

The bodies were almost of the specific gravity of the water. You could bring two of them along at the same time; they would swim after you through the water apparently without any weight at all.

The two I brought after the first one I left at the foot of the ladder, not knowing that Carr and Applegate were having any trouble. Then I went back again, and got one more and put him also near the hatch.

Next time I brought two. I was crouched over and backing along that narrow passage between the engines, and I backed right under the out-jutting floor plates of the C.O.C., towing these two.

I found suddenly that I couldn't go any farther, and stopped. Then, as I tried to straighten, I struck overhead. Then I had to wonder, 'Where am I and how did



I get here?' I felt overhead, and struck the floor plates. Then I knew I must look out for myself pretty sharp.

I pushed the two bodies away from me, and figured what to do, the first thing being to see all clear carefully round my gear, and then go forward stooping over. In a moment I felt the edge of the floor plates, and was in the well at the foot of the hatch.

I looked up to where there ought to have been a gleam of light coming in at the hatch, and saw one of the bodies caught across the hatchway. I was standing in the midst of five bodies; this man was caught, the coaming of the hatch hitting his neck, and Carr and Applegate, on deck, were trying to pull him up, but couldn't get him head-right. The moment they gave a little slack, I got that man upright and passed him out.

Then I telephoned the topside to tell Carr to send me down a line, and I would bend on the bodies. We got four on one line, though the topside was expecting only three to go on one line. I told the topside to send us another line, and I would send them up as fast as they could handle them. But with the long time already consumed, our time below was already running out. So, though I found six bodies, I sent up only four.

Eiben, Wilson, and Mattox followed us, and Eiben and Wilson secured the two bodies I had left. Campbell and Baker followed them, and got three more bodies, still finding them in the engine-room. Wickwire, Kelly, and Burd passed up one man. That was all they could find.

Ingram, Scott, and Burns went down next. Ingram's job was to get into the C.O.C. He found the door was

wedged with a two-by-six on the engine-room side, but he got the door open and went as far forward as the officers' quarters. He couldn't go any farther, he reported, because there were bunks that blocked his way.

Next day, January 8, Carr, Nicol (the gunner), and I went into the C.O.C. to examine the periscope. We found it easier to get through the doors than on the S-51. You would still hang up, but they were an inch or so wider than in the other boat.

We found the after periscope wires taut, and the periscope in the well; the casting that carries the eye-piece was level with the coaming round the well, and you couldn't look into it if you lay flat on the deck. On the forward periscope the wires were slack, and the periscope was well down into the well. There is no way of telling whether her periscope was up or not when the S-4 was hit, though it was found afterward that the top eye-piece was looking toward the buoy at the end of the course.

I cleared up a lot of stuff in the passageway — buckets, books, and a locker cushion — and put them in the officers' wardroom to port. Then I got to the battery-room door and found it dogged down on three dogs, tight. It had about a dozen dogs, but they were really not needed, for the door was seated by the water pressure from the battery-room.

I dogged them all down tight, and closed a valve in the floor on a small line to the battery-room. Then I closed the voice-tube in the officers' washroom and secured the washroom door, because it opened out and bothered us in the passage. Next I tried to close the flapper valve on

the battery ventilation line, and couldn't. There was something in it.

All this time Carr was tending me from the C.O.C., and the other man was standing at the foot of the engine-room hatch tending both of us. But our time was up, and we went aboard.

Eiben and Wilson, who followed us, also went into the C.O.C., and tried to close that flapper valve. They also failed. Campbell, Crilley, and Baker went aft into the motor-room, and tried to open the motor-room hatch from the inside. They couldn't make it, and found it would have to be opened from outside.

Wickwire, Kelly, and Burd went into the C.O.C., and they also tackled that ventilation line. They closed the flapper valve at the after end of the C.O.C., and the drains forward.

It was noticed on this day that the air had a tendency to freeze. Many of the divers found that their air would stop entirely at times, and then slowly start again, but never came back to the full amount. Five men had their air freeze on this day, which was a long, arduous, and really dangerous day.

It was very foggy next morning — and it was becoming apparent that the humidity in the air had a good deal to do with the freezing in our valves. We put the dummy over the side, and his air froze, coming on and going off again in spurts. But we decided to try diving anyway, and Ingram and Grube went down and cleared the wooden fittings over the motor-room hatch. Campbell and Crilley went in there, but, as Campbell got in, his air started to freeze and he had to come up. So then

it was thought foolish and risky to try any further, and we knocked off work for the day.

Next day it was extremely rough and we stayed in the inner harbor. Crilley and Eiben went down there to try out the new telephones, and found them splendid.

I had now been long enough on this job to be able to decide that I was all right. I had not had a particle of heart trouble; there was no fluttering, no getting all haired up when I started to do anything, and I was inwardly very much tickled by my ability to go on working.

We put the dummy overside again on January 11, the following day, and again his air froze. But we decided to try diving and Campbell and Crilley got into the motor-room. Campbell passed out six more bodies.

Then Carr and I went down. I passed out eight bodies. We had another man with us, but he shrank from handling the bodies of the S-4 men, and that left Carr in a pickle. I had been finding them fast, and had no notion that Carr was single-handed. When he didn't take one that I held for him, I went out on deck.

Five bodies lay on the deck and Carr was standing with one held between his legs and one under each arm. He dared not move because the current might have carried the bodies away. He surely needed a hand. So he held them, and I bent the line onto them. This total of eight was the largest passed out in any one dive.

Wilson and Eiben followed us, and found one more body. Wickwire and Kelly followed them, and looked for more bodies, for there were two of the ship's comple-



ment still unaccounted for. They were never found until the S-4 was in drydock at Charlestown.

Ingram and Burns were the first two men to dive on January 12. They cleared out the mooring-line locker, and opened the deck torpedo hatch. Scott and Miller followed them, getting ready to put a strong-back on the outside of that hatch.

Carr and I followed them on the same job. It sounds like a small detail of the job, and it was, but it holds an illustration of what a diver's work is like. We were trying to find a holding place for the ends of two bolts that would eventually hold down the strong-back on top of the hatch. We all knew that in a bulkhead just forward of the hatch, close up to the deck, there were two holes, one on each side, which were probably put there for just that purpose when the boat was given her air-pressure test before going into commission.

We had a light, as the divers always did when working inside the boat. And the place where we had to work was in very small lockers just aft of the bulkhead. It was a cramped position, with little chance to move your helmet around — and we couldn't see those holes.

Finally the simple solution occurred to me, and I put the light forward of the bulkhead. The rays shone through the holes and they proclaimed themselves.

Campbell and Crilley were next; they started to drill — and tap — a hole in the torpedo-room hatch itself, to connect up a hose for blowing the compartment. For, as I have said, when we were sure nobody was left alive in there, we had flooded the compartment. They could not finish that day, and on the 13th it was so humid as

to mean great danger of freezing the air. But they went over, finished drilling the hole, and tapped a thread in it.

Now began the almost endless work of burning holes. We had an acetylene torch, which wasn't too satisfactory. Not everybody could use it, for it was difficult to regulate the gas supply. But Wickwire and Kelly went at it, starting to burn a hole in the top of the torpedo-room for a spill pipe. This is a pipe which runs right to the bottom of the compartment and ends there in a strainer. It is to take out the water as air is forced in. The torch wouldn't work, of course, and they weren't successful. Carr and I went down, and put the strong-back on the torpedo-loading hatch, but it was getting squally, and we all had to knock off.

It was very rough next morning, and we had to up anchor and go into the inner harbor. By noon, however, the sea was calming off and we got back to the wreck. Carr, Applegate, and I made the first dive. Carr and I went into the C.O.C. and opened the forward C.O.C. door. We tried to close the flapper valve of the ventilation pipe on the battery-room side, and got the handle down all right, but couldn't get the locknut on. This was the valve whose failure to close had flooded the C.O.C. and driven the crew from control of the boat — and was the real cause of the loss of the crew.

Just then I had one of those accidents to be expected when diving under such dangerous conditions. My air shut off entirely — and there I was. The air was off for two minutes; four minutes is the length of time you can stand it at that depth without air.

I shut off my exhaust valve to save what air I had in my suit. The time needed to go from the forward door of the C.O.C., where I was, to the engine-room and on deck, is six and a half minutes, and two minutes of my four were gone. So you can see I should have needed to make some speed to get out of there.

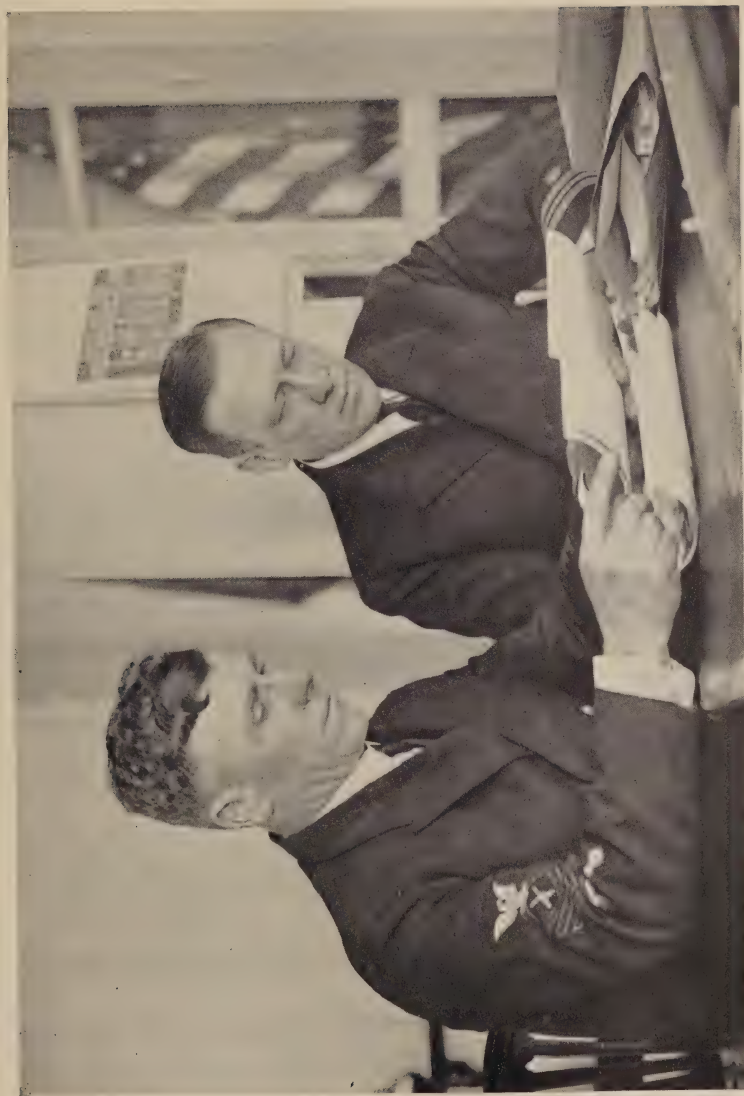
I had wasted practically half my life, waiting those two minutes for the air to come on again. I was on the point of telling Carr to 'stand by — here goes a streak!' but hunted first for a wrench to knock my control valve, and jar the needle valve loose from the frost that had stopped the air.

Luckily, I found the wrench, knocked the valve, and cleared it. I said nothing to the people on the surface until after I got up. Then I got a bawling out from Gunner Tibbals for not starting up at once when the air shut off.

Wilson and Eiben, with Grube tending them below, next tried to close that flapper valve, and failed as the rest of us had done. Then I went over to the S-6, which was standing by, to figure out some device to hold the lock stem so the screw could be screwed back. We adopted something we thought would answer the purpose.

The next two days were hard-luck days. On the 15th, we couldn't pick up our moorings at all, and on the 16th, though we went out and Wilson and Eiben got ready to dive, the air froze and we had to knock off.

They took Carr, Michels, and me to Boston that afternoon on the Mahan, to testify in the hearing on the disaster. We were the first three men to go down on the



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AT THE S-4 INQUIRY





wreck, and our testimony was as to the conditions we found.

On January 17, just a month from the day the S-4 was sunk, I began my testimony. Court adjourned before I finished, for the court was to go to Provincetown and see the conditions that were supposed to have existed on the day of the accident.

What they did was this: The board came to Provincetown and went aboard the Mahan or the Maury, whichever happened to be there that day, and went outside to Wood End. Then the S-6 or the S-8 — I don't remember which — ran submerged toward them.

A day was picked when the conditions were as nearly as could be the same as on the day of the collision, and the idea of the thing was to see how far away the men on the Mahan, which was representing the Paulding, of course, could see the submarine's periscope.

I finished my testimony on the 18th, and then went on leave for a few days. I came back on January 23, and found I hadn't missed anything, for it had been all that time too cold or too rough to dive.

Telling all this detail of the work on commonplace tasks like drilling holes, turning valves, taking a chance of air freezing, doesn't in the least show the excitement and anxiety, the pressure and desperate hurry of what we were doing.

Just at this time, for instance, there was a crying demand that the bodies be got out of the torpedo-room. One woman even got the governor of her State to demand her husband's body, making the demand on the Navy Department. Everybody sympathized with her,

and with the other women whose men's bodies still lay at the bottom of the water. But these people couldn't understand the conditions.

You couldn't come into the torpedo-room by the way of the compartments. To do that we should have had to go in through the engine-room hatch, ninety feet away. The distance in itself was deadly, and the way in through the battery-room was choked with wreckage. Finally, there was a ladder right in front of the door to the torpedo-room, and you couldn't get under it and in at the door, in a diving dress.

The torpedo hatch, over the torpedo-room, is on an angle, set so that when the sub was loading her torpedoes aboard they could be taken in and slid down on an angle. Now a diver could back down that slide, and at its inner end drop off onto the torpedo-room floor. His shoes and belt would keep him upright. But getting out again was a different matter. You couldn't pull yourself up onto that slide; you had to bend to get there.

I volunteered to try it, but they said, 'No — it would only mean seven men in there instead of six.' But I wasn't going it blind; I had figured out a way. I was going to slide a stout metal bar alongside the torpedo slide, and have it long enough to go all the way to the floor on that angle. Then I meant to use it as a trapeze to pull myself up on, taking the proper angle before I started. I could cut off my air supply to make myself heavy, and a man outside could catch my helmet and pull. But they wouldn't let me do it.

We had had so much trouble with air freezing that the men at the Charlestown Navy Yard had worked out

a device for pre-heating the air before it went to the diver. The trouble seemed to be that damp air would freeze, and a foggy day meant almost sure air-freezing.

So the Falcon went to Boston to have the new device installed, on the 23d. It was put in under the direction of Admiral Andrews, and on the 25th the ship left Boston at 4.30 P.M. She hit right into the teeth of a gale, with a sea that was coming aboard so freely that it put out the lights in the engine-room. We never got into Provincetown until 9.45 that night.

Next day we tried out the new device. The pressure dropped so much that it indicated everything was not yet as it should be, and we worked at wrapping the hose connections with muslin dipped in paraffin and lacquered, in the hope of preventing the connections from freezing.

Next day, January 27, we got out to the scene of the disaster, and I went down to try out the new device. I landed on the submarine, but for the first ten minutes I was very dizzy. The air had a peculiar smell, and it seemed as though my lungs wouldn't fill with air. All my movements had to be slow. I went forward and secured a new descending line, but that was about all I could do.

Carr followed me, to clear out some gear from a locker; it was in our way. He also felt the effects of the new air. Eiben was the next man, but his suit leaked and he wasn't down very long. Then Wilson went, to clear away the deck so that Kelly, the best hand with the torch, might burn a hole into the torpedo-room. Wilson didn't like the new air, either.



Crilley went next. His job was to clear away some wires that were hanging around and threatening to foul us. He reported that the air was getting better. It was figured that the bad air was caused by the oil in the packing of the pump being forced down to the diver as it was volatilized by the heat, and that it was now working off. I, being the first, got the heaviest dose of it.

Kelly went down next day, the 28th, to burn his hole. He burned out two tips, but made no headway, and then it came on to blow and we had to quit. It blew hard all the next day, but on the 30th, though it was very cold, we went into our moorings and I started down, with Carr and Scott, to fight that flapper valve on the ventilation line again. I got the valve down in the battery-room, but the nut on it was jammed, and we had to have a special tool made for that.

It was very close quarters in that passageway between the wardroom and the washroom. You would scrape the paint off on both sides, on the nut on your face-plate and the weights on your back. Sometimes you would rub so tight that it would close your air-control valve. But you could wriggle around, and finally get through. However, it was altogether as tight a place as any diver has ever been into.

Eiben, Wilson, and Burd went down next, and closed the flapper valve on the C.O.C. side of the door. It had already been closed once.

Campbell and Crilley followed, with the task of breaking the flange on the salvage air line, and blanking it off. This was the line thought to be ruptured — though it wasn't. But to seal the boat, we thought it was neces-

sary to take out the bolts where two flanges came together, and then to put over one end a flange with a plate all the way across, to seal the line. They got all but one nut off the flange, and then their time was up.

We started after these jobs again next day, and then came a wonderful thing. In the midst of my work I found myself, one hundred feet under water, with my head sticking up out of water and in the air.

Carr and I were working in the C.O.C. I went to work at the flapper valve on the battery-room side, and Carr on an examination of the air manifold, to see which valves were open and which closed. He found there was very little air in the banks; they had used most of it trying to blow the boat to the surface. All but two of the Kingston valves — the valves that open into the sea outside — were open, and, because they had settled into the mud, they couldn't now be closed.

I was working on the flapper valve, and noticed for the first time that the ventilator pipe was crushed and broken away from the heavy brass casting in the bulkhead, the casting that has a flapper valve on each side.

I was so intent on my work that I didn't notice it, but my exhaust air had been forcing water out through the gash in the S-4's side, and the air was held in the top of the battery compartment. So there we were, a hundred and two feet below the surface, and my head out of water.

Then I could see that there was something in the casting, underneath the valves. I tried to pull it out, but couldn't. Of course, it was the curtain that had drifted off the commander's quarters and into the valve,

but the other flapper valve, which was closed by our special device, was right down on the curtain itself.

I told them on the topside, by telephone, what I had found, but they said my time was up and I had better come up. When I got to the surface, I explained the situation fully to them, so Wilson, Eiben, and Burd went down, slacked up the flapper valve on the C.O.C. side and pulled out the curtain.

At last we had the secret of the loss of the S-4 and all her men. It gave you a feeling of helplessness to look at the thing and to hold it in your hand. It looked so harmless by itself. It wasn't like a crashing steel prow, to cut into a vessel's side and down her, or a wicked torpedo that could have shot those men to death in one big explosion. It was just a dirty, limp, green rag.

## CHAPTER XIII

### THE MEDAL OF HONOR

By this time, it was almost the first of February. There were a thousand small jobs still to be done, and every one of them was of absolute importance. I mean that not one of them could be left undone, if we were to be sure the S-4 would come up when we tried it.

We were getting near the time when we could seal up the compartments of the boat, and we were working in teams, two, three, and even four divers working at a time.

Grube and Mattox made one last trip to search through the motor-room for two bodies that had not been accounted for, but couldn't find them. But the divers pulled out the ladder and the floor plates under it, so that when we put the spill pipe in, it would go to the lowest point in the compartment and get all the water out when we began to blow.

Campbell, Crilley, and Baker, the next team down, blanked off the salvage air line, which we had believed was broken, and made that tight. And then came one of those vexatious jobs.

Wickwire, Harris, and another man went down to hook on blowing hoses to the tank salvage. It sounds like a simple job — just to connect up hoses to blow the water out of the tanks.

All right; six men worked at dressing them; three tenders and three telephone tenders took charge of them;



everybody on deck helped them to get overside; they themselves went down through that icy, black water one hundred feet to grope round on the submarine and take desperate care against entangling one another's lines — and found that the connections they had taken down didn't fit.

They had to come up without accomplishing anything. Grube and Applegate took down what was needed, and hooked up.

Not enough has been said about the tenders who cared for the divers on this S-4 job. They had to stay put, along the rail, in that icy weather, and stay right on their toes all the time. They knew that the lives of the men on the bottom were in their hands.

There was always a breeze — and a winter breeze off Cape Cod is no joke. The spray froze where it struck them, but they couldn't dodge. Sometimes solid water came aboard. They had to stay and take it. Being stuck in one place like that, it's a wonder their hands and feet didn't freeze — for, of course, they got no chance to get their circulation going.

The telephone tenders, too, were held to one spot by their head-sets. It took real heroism to go through what these men at the rail stood through that weather, week in and week out, still on deck when the first diver had finished his dip and was tucked away, and they still had to tend another. They were wonderful fellows, and every diver has deep gratitude to them.

It was February 1 when we finally closed that fatal flapper valve. Carr and I went into the C.O.C., and I first closed the valve on the battery-room side of

the door. Of course, it now fitted fine, on its regular seat.

We closed the C.O.C. door, and dogged it down tight, and then I closed the flapper on the C.O.C. side of the door, put in the new bolt, and set it up. At last we had the C.O.C. tight, and ready to be sealed against the day when we should unwater it. The battery-room had to be left flooded because the gash was in that compartment.

I left Carr checking up on the manifold, and went on deck, and this was the time when I found the ship's bell, hanging over the side, and salvaged it.

We were still having all sorts of trouble. Eiben, one of the older divers, was badly bothered one night by a 'bubble' — which is the manifestation of the 'bends.' He had to go under pressure, and the pressure had to be run up to eighty-five pounds — the equivalent of what he would have had at two hundred feet deep — before it would relieve. He spent the whole night in the tank, and was not relieved entirely until nearly noon of the next day.

It was about this time — in the first of February — that Fred Michels took his first dip after his accident. He had begged to go down, and he had been irritated because he got the idea that the other men thought he was done with diving for good and all, while he himself felt sure he was all right. When he came up from that dive, and had made it all right, he was as happy as a kid.

Wickwire and Applegate tackled a job that was a new invention; I think Commander Ellsberg was the man who suggested it. There are a lot of tubes and pipes on a submarine that have to be made air-tight and water-

tight if you are going to raise her. Some of these we can shut off with valves. Some of them we 'blank off' — that is, we free an end with a screw thread on it, and screw a blank cap right over the open end of the pipe. But there are places where neither way will do.

The main air induction line was one of these. And the way we had to make it tight was to fill the pipe with a quick-setting cement that would harden under water. We sent it down through a hose and put it right in under pressure.

Wickwire and Applegate cut a hole in the fair-water — that is, the protection on top of the submarine's deck — in order to get at the main induction line, and fill it up.

McNulty and Fred Michels had the other kind of job — to take off the S.C. tube, and cap the pipe. Even so they had a miss; McNulty fell overboard; the deck is very narrow forward, where the tube is. McNulty couldn't help Mike, and Mike couldn't make it alone. So they didn't get it. They couldn't make it the next day, either; it was too rough to dive at all. It was the third day before they could get down and cap off the tube.

We were getting one compartment ready for sealing at a time. And, of course, as soon as one compartment was ready, we had to hook up the air hose and blow it dry, all sealed up, to test it for leaks. It wouldn't do to go ahead and start raising your boat, and then have the air leak out. So we blew, after getting our spill pipe into the lowest point in the motor-room, so that it would drain out the last of the water.

That is a simple thing to say. But it took four men

to fight that pipe into position — I think they were Wickwire, Applegate, Baker, and Crilley.

It took three of them to do almost any job, working together. Three men secured the motor-room hatch; three men put in the hose coupling for the C.O.C.

We had to weight the conning-tower hatch to make sure it would stay closed, for it is designed against outside pressure, and we were going to put the pressure on the inside. So Harris and Wickwire had to build a sort of crib on the hatch to keep the weights from sliding off, if the boat should not happen to come up absolutely level, and Michels and Bailey loaded about two tons of lead into the crib.

The work on the C.O.C. was completed on February 6; on that day Wilson and Mattox closed the door and connected up the hose to the salvage air line.

Then we had a fine job to salvage the oil in the S-4's fuel tanks, not so much for the sake of saving the oil — though it did cost money — but because if it were blown out into the sea it would pollute the shore. This was a terribly long job; so was the breaking of the flange on the main induction line, to couple up the cement hose.

A third job was burning the holes into the torpedo-room — one set for the air hose and another for the spill pipe. This work was done with an electric torch. We had been using the acetylene torch, and Bill Carr had proved to be the best hand with it. But it was terribly slow; one hole had to be cut, tapped, and set up for the air lines, and then the next one. It was a tedious process, and it fairly got men's goats, the progress seemed to be



so slow. We did better, however, when the electric torch was used; it cut much faster, and it would even granulate copper under water.

How slow and how exasperating this work was you can guess from the fact that in one day, on flange-breaking and hole-burning, seven different crews of divers were down, one following another on these two jobs alone.

New men came on the job and did wonderful work. Waltz, Kallinowski, Van der Wall, and several others arrived about this time.

How mean some of the jobs were is shown by one I myself drew. In setting the bolt-holes for the spill pipe, of course they must come exactly over one another. Well, though you can see at the bottom, you can't always see as well as you could in a machine shop. So, of course, two holes happened to come not quite in line, and we had to put in a 'tap bolt' — and try and get one of those things water-tight!

In the end, all our work of getting ready to salvage the oil was wasted. It wouldn't blow, for there was one valve which we could neither open nor close. We tried, but the valves were in awkward places, usually away over at the boat's side and under something.

One of my own narrow escapes was at this work. I was in the engine-room, opening and closing various valves, as needful to blow the oil from the forward tanks aft. I was down with Scott and McMullin that day, and was trying to reach some valve or other in an awfully tight place. Scott was pushing my head down and trying to shove me in, but he didn't succeed. When we



COMMANDER SAUNDERS TURNING ON THE AIR TO FORCE  
THE S-4 TO THE SURFACE



CONNING TOWER OF THE S-1 EMERGING FROM THE WATER



got the S-4 into drydock, we discovered that, if I had got in there, it would have been a mighty tight pickle to get out of again.

We celebrated Valentine's Day by blowing the torpedo-room dry and inspecting it for leaks. Two days later, we lost most of the working day, for the tug Mohave, which was our supply boat plying between Boston and Provincetown, went on Thieves' Ledge, up near Boston Harbor. The Falcon had to go inside and ship a pump to Sagamore, to try and salvage the Mohave.

On February 17, just two months after the accident, we tackled the heavy job of laying out the towing arrangements. First Baker and Applegate made fast a line away aft, on the propeller shaft, for sending down the stern towing pendant. The towing chain was arranged like a Y, the stem of the Y going out aft and the two arms round the submarine. McMullin and I spread the chain out on the stern, but we couldn't hook it up. We had to stop when McMullin fell off the stern; I couldn't go on working because he had the tools with him.

The topside told me to go and find him. I walked up and down, but I couldn't see him, and he had got so far away from the boat that he thought it best to be yanked up. I had to follow; there was no sense in my staying there: he had the tools.

Two other pairs of divers tried, one after another, to hook up that chain. But they couldn't get enough slack. Michels and Van der Wall finally made it.

The next day it was very rough, and on the day following that I was ordered to Washington. Congress had



voted me the highest honor that can be paid in this country, in recognition of my having pulled Michels out of his bad fix. It was the Medal of Honor.

So I came to Newport and took my wife and daughter to Washington by train. Captain King had written to ask when the Department desired to have the presentation made while I was busily working on the salvage, and the Department had set February 23.

So I got two days at home and then stopped over a day in Philadelphia with my wife's sister. Then we went on to Washington to go through a trying ordeal — and one which, though I surely felt the honor that was being bestowed on me and even felt it was too much for what any man in my position would have done, still gave me no thrill.

We were met at the Union Station in Washington by Lieutenant Weickhardt, the liaison officer of the Veterans of Foreign Wars. He had been detailed to take care of us; he made our hotel arrangements, was our guide on a sight-seeing trip, and generally speaking kept us on the move.

We got to Washington on the 22d. Next morning the Lieutenant turned up bright and early, for I had orders to report at the office of the Secretary of the Navy at ten. There I met the Secretary and Admiral Hughes, both of whom I had met at Provincetown, and Admiral Leigh, Chief of the Bureau of Navigation. There was some little chat, and then Secretary Wilbur told me to be at the White House executive offices at 12.30.

Before we went there, however, I called on my Congressman, Mr. Burdick, who said he would like to go

over to the ceremony. I told him we would call for him in time, and we did so.

We got to the White House and were escorted into the reception room in the executive offices. When I went in, I was surprised to see so many of my relatives — brothers, sisters, and their wives and husbands. It made a quite impressive crowd.

I had a few minutes with them before the time of my appointment arrived. Then I was escorted by Secretary Wilbur and my wife by Admiral Hughes, to be introduced to President Coolidge.

The President said to me, 'I'm glad to know you, and I thank you for your services.'

I said, 'I want to assure you, Mr. President, that everything humanly possible has been done on that job, under the circumstances.' He nodded.

By this time my little procession was moving on. He shook hands with all the gang that was following me, remarking, 'Quite a large gathering.'

I said, 'I come of a large family, sir.'

We were now escorted out to the lawn, where a flock of camera-men were waiting. As the President came out, all hands stood to attention, and the Secretary read the citation. He handed the President the Medal of Honor, which has a clasp, and the President fastened the ribbon of it round my neck, afterward shaking hands with me.

Next the camera-men had their turn, and they ordered the President of the United States round like a rookie. A Secret Service man stepped up and took charge of them. 'Stills first,' said he, and we posed for the pictures. Again the Secretary pretended to read the

citation; again the President good-naturedly took the position of pinning on the medal. The camera-men moved nearer and got 'close-ups.' Next it was the turn of the movie-men, and the whole ceremony had to be gone through a third time, for their benefit. Finally the Secret Service man said, 'That's enough.' But they kept me there, and I had to pose again with the family, the Secretary, and the admirals.

Those camera-men are quick to grab a chance for sentiment. Somebody made a remark, and I said, indicating my wife, 'Here's the one that deserves the medal.'

One of the photographers said, 'If you really mean that, kiss the wife' — and I had to kiss her and the kid for the pictures.

Then at 2.30 we had to report again at the Secretary's office and go out to make 'talking movies' — the Secretary, the two admirals, and myself. The Secretary read the citation again, and congratulated me; the admirals also congratulated me, and I spoke a few words myself.

Next, my Congressman brought up a reporter who was a correspondent for one of the Newport papers, and who wanted to find out how I felt during the presentation. I told him I didn't feel any out of the ordinary.

'With the President of the United States waiting on you, didn't you get a thrill?' he asked.

'No,' said I.

'What did you think about it?'

'I expected it; I didn't think about it at all.'

He looked disgusted and turned to the Congressman,



EADIE DECORATED WITH CONGRESSIONAL MEDAL OF HONOR BY THE PRESIDENT

*Front row, left to right: Secretary of the Navy Wilbur, President Coolidge, Tom Eadie, his daughter, and his wife*





who asked me to come over to his office. Then he tried to interview me, but he didn't get any more than the reporter. I told him, 'There is nothing I can tell you. The thrill I'll get is when the boat comes up.'

Lieutenant Weickhardt finally volunteered to write the story. He wrote about a column, and, though he didn't quote me, he insisted that I was thrilled.

We left Washington that afternoon with a brother who was driving home to Newark, stopping off in New Brunswick to visit another brother. In Newark I got an experience of public speaking, going to two chain theaters at the request of a relative just to make an appearance.

I had already made a speech, at the banquet to Commander Spafford of the American Legion in the Statler at Boston. There had been numerous requests for me to speak, sent to Captain King, while I was on the job, as a consequence probably of the newspaper headlines about my rescue of Mike. And this one, for a banquet on February 4, came many weeks ahead, so I accepted carelessly, thinking there would be plenty of opportunity to get out of it.

The first thing I knew I had leave, asked for by Admiral Andrews, and was at the table in uniform waiting for the Admiral to introduce me. I remember that I was very far down on the programme, and when I did get up and saw a microphone in front of me I stood for a full minute in a daze.

The Admiral said, 'Talk to 'em, Tom,' and I turned and grinned at him, and went to it. I put it over — at least the diners seemed to like it. And I cut it short in

order to catch the night bus for Newport, since I was due back aboard next day.

After my return from Washington, the requests for me to speak came in so fast that I finally made up a tour, starting in Plymouth and covering Kingston, Hartford, Winchendon, Gardner, New Bedford, Fall River, Springfield, Holyoke, Northampton, and Providence. I spoke for high-school pupils, Kiwanis and Rotary clubs, police organizations, electrical engineers, Lions, Legion, and even a men's club in a church. Finally, I spoke over the radio for WBZ, for a mortgage and loan corporation.

While I was away, the divers had laid out the towing pendants on the bottom and made them fast on the S-4; they had burned endless holes to get at the oil fuel and got all ready to blow the forward tanks by hooking on connections. These preparations went on after I returned, on the 29th, and by March 3, the oil was being salvaged and the tunnels were being washed out again to get ready for the pontoon chains. They had filled in, of course, quickly after they were first dug.

On the 4th, Admiral Andrews and Admiral Hughes visited the ship, and presented the Navy Cross to Michels and Carr for their work. We couldn't work on the 5th, but next day almost the whole force of divers worked at washing out the tunnels. We finished the work on the 7th, and Crilley and I put through the reeving lines before it got too rough.

It was still rough next morning, but it calmed down at 1.30. We got one chain under the sub, and tried another, but the wire carried away. Wilson and Kallinow-

ski went down to locate the end, but they couldn't find it, and the chain had to be hauled on deck.

The work had to be done over again. Crilley and I went down, and I sent the end of the light line through under the keel to Crilley. He made a cow-hitch, and it went adrift. Finally Carr and Grube went down, and they got the line through. The second chain was then sent down.

March 9, the work of trying to get wire round the chains for back-lashings was stopped by the blowing-up of a real gale and snowstorm. In the evening we got an S.O.S. signal from the Robert E. Lee, a steamer that had gone on the rocks at Manomet, and set off for the scene. It was so rough that we just stood by, being assured by her wireless operator that she was in no immediate danger.

When daylight came, there were two one hundred and twenty-foot coast-guard boats, one of the coast-guard tugs, the Bushnell, the Mallard, and ourselves, all standing by. It was still very rough, but quieting down somewhat, and it had stopped snowing.

The transfer of passengers was made during the morning on the lee side, in coast-guard surfboats, and all hands were taken off safely. One surfboat capsized, and, according to the report we received, two coast guardsmen were drowned and another died afterward.

We left and went back to Provincetown, and on March 11 had all chains ready for the pontoons. It took us until the 17th to place the pontoons themselves. Then we hooked on all air lines, took all the air we could get, and started blowing. The operation was entirely



successful; the S-4 came to the surface level, and we towed her through the night, keeping in shallow water, to the Boston Yard, where she was drydocked.

I nearly missed being there for the finish, as it was. The divers who belonged in Newport were invited to a banquet in their honor, and a dance on the following night. We all got a week's leave, but we took care to keep in touch with the communications office, and, when it seemed as if the final pontoons would be down the next day, we cut our leave short and beat it back to Provincetown.

The Department made it easy for me to take my speaking trip in April and May, granting leave for the purpose, for it was really good publicity for the Navy.

Since then I have been back on the station, doing my work and going on to the end of my time, which will come in 1932. I was not used on the experiments made by the Navy with various safety devices for submarines, and know of the work only as it was told to me when I was offered the chance to take part in it.

The S-4 was cleaned out; her engines and equipment were removed, and she became a mere piece of laboratory apparatus. They sank her in the Great Salt Pond at Block Island to try out the heavy 'pad eyes' to which derrick falls could be hooked; they built an 'escape hatch' on her deck to try out the so-called 'lung' or emergency diving dress, and they worked out experimentally dozens of other devices submitted to the Navy.

None of the devices will ever remove the fact that the sea is dangerous, or the fact that not failure of equip-



THE S-4'S CONNING TOWER AT THE BOSTON NAVY YARD



ment but failure of the human equation, is most responsible for accidents. No matter what is invented for safety, there will always be accidents. They will always need divers. And the divers will always get a thrill.

**THE END**





## APPENDIX

### I

#### THE OFFICIAL CORRESPONDENCE FOLLOWING THE WORK ON THE S-51, AND THE AWARD OF THE NAVY CROSS

8 September 1926 FWS

From: The Salvage Officer

To: The Officer-in-Charge, Salvage Operations, U.S.S. S-51

Subject: Thomas Eadie, Chief Gunner's Mate (F-1), U.S.N.R.

1. The Salvage Officer desires to call attention to the bravery of Thomas Eadie, Chief Gunner's Mate (F-1), U.S.N.R. and the exceptional value of his services as a diver in connection with the salvage of the S-51.

2. Eadie, who in his civilian status as an Ordnanceman at the Torpedo Station, Newport, was not subject to call as a diver on the S-51, nevertheless volunteered his services, and with the permission of the Inspector of Ordnance, joined the salvage expedition and served with it throughout the operations.

3. It shortly developed that all other divers looked, with good reason, on Eadie as the Master Diver, and he was so regarded also by the Officers connected with the work. In a group of brave and skillful divers, Eadie was without doubt, the best. He was the first man to force his way through the submarine and into the Central Operating Compartment, a dangerous task which several men before had tried without success. Having showed the way to the others, Eadie accompanied them thereafter in the difficult job of sealing up the inside of that compartment — a place where the slightest accident to the diver or the failure of any part of his equipment meant lingering death, for by

no possible means could a diver caught there be extricated by others.

4. In the work of tunneling under the boat, a task hardly less dangerous than working inside, Eadie again was the leader and it was mainly due to his personal skill in this operation that the first tunnel was finally completed.

5. On every job, whether dangerous or difficult (most jobs were both) Eadie was always called on to make the start and blaze the way for the others — a task in which he was highly successful.

6. Aside from his actual work as a diver, Eadie was most valuable in his suggestions to the officers supervising as to the best methods to be followed and in his reports of progress made.

7. Finally, Eadie's cheerful spirit and steady loyalty were of the utmost value toward the end of the job, when to many of the worn-out divers, the task looked hopeless and they felt themselves unable to continue; in this situation Eadie's example in keeping on, in spite of the fact that he himself was suffering from bends and strained ear drums, and that he was a shadow of his former self, resulted in the other divers following his lead to a successful conclusion.

8. It is gratifying to note that a result of the preliminary report made by the Officer-in-Charge of Salvage Operations, Eadie has been awarded the Navy Cross, together with certain other of the divers who were also promoted.

9. Eadie's position in the Naval Reserve and in the civil establishment of the Navy Department has resulted in some delay in recommending him for promotion. It is now recommended that the Navy Department request Congress to enact the following act to promote Eadie:

‘Be it enacted by the Senate and the House of Representatives in Congress assembled:

‘Sec. 1. That Thomas Eadie now a Chief Gunner's

Mate, with acting appointment, in Class F-1, Fleet Naval Reserve, in recognition of his services in connection with salvaging the S-51, be transferred as a Chief Gunner's Mate with permanent appointment to Class F-4-C, of the Fleet Naval Reserve, effective July 5, 1926.

'Sec. 2. That for all purposes the service of Thomas Eadie in the Navy and the Naval Reserve Force since July 6, 1905, shall be deemed continuous service and that all service of Thomas Eadie in the Naval Reserve Force since December 16, 1916 and until July 5, 1926, shall be considered to be active service in the Navy.'

EDWARD ELLSBERG

*Lieutenant Commander (C.C.) U.S.N.*

*Salvage Officer, U.S.S. S-51*

SS162/LA33/Am28

U.S.S. FALCON

BLOCK ISLAND AREA

20 June 1926

From: Commanding Officer

To: The Chief of the Bureau of Navigation

Via: (1) Officer-in-Charge, Salvage Operations, U.S.S. S-51  
(2) Inspector of Ordnance in Charge, U.S. Naval Torpedo Station, Newport, R.I.

Subject: Thomas Eadie — Ordnanceman — Commendation for services as diver connection salvage of U.S.S. S-51.

1. The Commanding Officer desires to commend Mr. Thomas Eadie, for the excellent spirit of coöperation, zeal, and willingness displayed as a diver in connection with operations conducted by the forces employed in salvaging the U.S.S. S-51 during the periods 26 September 1925 to 30 November 1925, and from April 26, 1926, to date.

2. Mr. Eadie is an ex-enlisted man, having served in the Navy approximately twelve years. In the performance of



unusually difficult tasks assigned him, his conduct under the most hazardous circumstances was exceptionally exemplary. His ability as a diver, together with the spirit of coöperation and willingness, and the confidence which his personality instilled in others with whom he has been engaged in these salvaging operations are considered, in a large measure, responsible for much of the success attained in salvage operations. Mr. Eadie was one of five divers who performed the major portion of work on interior of S-51, which work was extremely dangerous and required unusual courage and fortitude.

HENRY HARTLEY

U.S.S. FALCON  
NEW LONDON, CONN.  
*November 11, 1926*

From: Commanding Officer, U.S.S. Falcon

To: TO WHOM IT MAY CONCERN

Subject: Thomas Eadie, Chief Gunner's Mate (F-1), U.S.N.R.

1. I understand a Bill will be introduced before the next Congress for the promotion of Thomas Eadie from Chief Gunner's Mate acting appointment in class F-1, Fleet Naval Reserve to Chief Gunner's Mate with permanent appointment, class F-4-C of the Fleet Naval Reserve, in recognition of his services as a diver during the salvage of the U.S.S. S-51.

2. Eadie was in civilian status at Newport, R.I., having learned diving while in the Naval Service. Learning of our need for deep sea divers during the salvaging of the S-51 — he volunteered his services, and joined the salvage crew.

3. Eadie came to us as a stranger, so to speak; from the very first he proved himself a very exceptionally able and intelligent diver and in a very short time all hands regarded Eadie as the leader or Master Diver — notwith-

standing the fact that we had 21 of the very best divers that the Navy possessed.

4. Due to his skill, willingness, and confidence in himself, he was assigned the most dangerous tasks, and always as the lead-off man on any new phase of the work, and in this capacity he distinguished himself several times by acts of bravery. If a diver fouled Eadie was always sent down to clear him, and the words over the telephone

‘Will send Eadie down’

never failed to inspire confidence.

5. In addition to his courage and skill shown during his work inside of the submarine, Eadie rendered invaluable aid in putting thru tunnels under the submarine for the pontoon's chains. It was here that he stood out most clearly as a brave and resourceful man, and his courage and ability to keep his head without doubt saved his life and the morale of the entire force. While working down in the tunnel under the submarine his exhaust valve became clogged with silt, his suit inflated, his belt and jock strap carried away, causing his helmet to raise up above his head and breaking his telephone connection. In some manner he held on with his feet, until his suit (diving dress) burst, letting out the excess pressure; with his arms free he pulled his helmet down into place again, came up to the decompression stage and in due time was brought to surface, his dress filled completely as high as the lower edge of helmet (diver's neck). Any but an exceptionally cool and courageous man would have lost his life on this occasion. It can be readily understood that to lose the Master Diver meant that few if any would again tackle the tunnel. Eadie was back on the job upon his next turn.

6. Unfortunately Eadie cannot be promoted on the retired list except by Act of Congress, though he has more

than merited this promotion. If promoted it will bind him closer to the Naval Service and he is too valuable a man not to secure with as strong ties as we may.

HENRY HARTLEY

*First Endorsement*

NAVAL OPERATING BASE  
HAMPTON ROADS, VA.  
9 September 1926

From: Captain Ernest J. King, U.S. Navy  
(Officer-in-Charge, Salvage Operations, S-51)  
To: Commandant Third Naval District  
Subject: Thomas Eadie, Chief Gunner's Mate (F-1), U.S.N.R.

1. Forwarded, heartily concurred in and strongly recommended for approval, as the proposed action will tend to reward Eadie somewhat to the same degree as certain other divers, among whom Eadie was undoubtedly the best.

2. In support of this recommendation there is quoted herewith a paragraph of my report on personnel dated 18 July 1926.

'THOMAS EADIE, now an ordnanceman employed under civil service at the Torpedo Station, Newport, R.I., was transferred some time ago to the Fleet Naval Reserve after sixteen years' service. EADIE is considered to have been the "MASTER DIVER" on the job and not only was he a master diver but he showed himself to be a man of the highest character. While modest and unassuming at all times, he exercised a most wholesome and steadying influence on all the divers by his unfailing loyalty, his skill and his readiness to do more than his share of the work. In my 29 years of service I do not remember having met any one who so thoroughly deserved to have it said of him, "He is a man." It is strongly recommended that EADIE receive the award of

a Navy Cross and such other recognition as shall be recommended in a separate letter which is being prepared on account of his status in the Fleet Naval Reserve and in the Civil Service of the Navy Department.'

ERNEST J. KING

LL/P15 (N-1)

*Second endorsement*

NAVY YARD,\*NEW YORK

FWS

From: The Commandant

To: The Secretary of the Navy

Subject: Thomas Eadie, Chief Gunner's Mate (G-1), U.S.N.R.

1. Forwarded.

2. The recommendation in the letter above and in the first endorsement is strongly approved. From the Commandant's personal knowledge of Eadie and his work on the S-51 salvage operation, it is desired to state that the action recommended is fully warranted.

3. The Commandant desires to call attention to the fact that for his services as a diver during the Spring operations, a period of about three months, Eadie's entire compensation was \$1300. The amount that the government saved in money alone by Eadie's services can best be judged from the fact that when the Commandant was endeavoring last Fall to bolster up the force of divers, which was then inadequate, by hiring civilian divers, the best offer he could get was the loan of four divers by a commercial salvage company at the rate of \$1300 per day for the four men, or in other words, \$1300 for the use of one man for four days. Such an offer was, of course, declined. It is interesting to observe that the expedition had the services of a diver who is believed to be without a peer anywhere in the world for a period of 3 months at practically the same cost as one ordinary commercial diver for a period of four days.



4. The action recommended above will place Eadie on a par with the other Chief Petty Officers who were divers on this job and most of whom will, within a year, be retired to the Fleet Naval Reserve after 16 years' service.

C. P. PLUNKETT

UNITED STATES NAVY YARD  
NEW YORK, N.Y.

No. SS162/L11-1 (N-1)

FWS 7/17

From: The Salvage Officer, U.S.S. S-51

To: The Inspector of Ordnance, Naval Torpedo Station,  
Newport, R.I.

Subject: Services of Thomas Eadie, Diver

Reference: (A) Comdt. N.Y. 1st SS162/L11-1 (N-1) 5 April 1926  
(B) Inspt. Ordnance Newport, 1st SS162/S94 6 April  
1926

1. All salvage work in connection with the U.S.S. S-51 including drydocking having been completed, the services of Thomas Eadie as a diver, in connection with the salvage and inspection of the S-51 are no longer required and he has been released from this job at the close of working hours on Saturday, 17 July 1926, with orders to report to his regular Station at the Naval Torpedo Station, Newport, R.I., on Monday, 19 July 1926.

2. A report of the time of Thomas Eadie is being made in a separate letter.

3. The Salvage Officer appreciates very much the assistance rendered by the Torpedo Station in loaning Eadie for this job, as he was without doubt the best diver used and his work was invaluable in leading to the successful termination of the job.

E. ELLSBERG

*1st endorsement July 19, 1926*

NAVAL TORPEDO STATION, B.

NEWPORT, R.I.

From: Inspector of Ordnance in Charge

To: Thomas Eadie, Ordnanceman

1. Forwarded, with Congratulations.
2. The original of this correspondence has been placed on file with your record.

E. B. LARIMER

THE SECRETARY OF THE NAVY

WASHINGTON

*2 August, 1926*

SIR:

The President of the United States takes pleasure in presenting the Navy Cross to

THOMAS EADIE, C.G.M., FLEET NAVAL RESERVE

For services on the occasion of the salvaging of the U.S.S. S-51 as set forth in the following:

Citation:

For extraordinary heroism and devotion to duty on the occasion of the salvaging of the U.S.S. S-51.

For the President.

E. W. EBERLE

*Acting Secretary of the Navy*

NAVY DEPARTMENT  
BUREAU OF NAVIGATION, WASHINGTON, D.C.

10 August, 1926

From: Bureau of Navigation  
To: Thomas Eadie, C.G.M., Fleet Naval Reserve, First  
Naval District  
Via: Commandant  
Subject: Transmittal of Navy Cross and Citation for same  
Enclosures: Navy Cross and Citation

1. The Bureau takes pleasure in forwarding herewith the Navy Cross and Citation bestowed upon you in accordance with the Act of 4 February, 1919.

2. A copy of the Citation will be made a part of your official record.

3. Please acknowledge receipt of the Cross and Citation.

W. R. SHOEMAKER

*Chief of Bureau*

W. D. TAYLOR

*By direction*

P-15      1st endorsement

DISTRICT STAFF HEADQUARTERS

FIRST NAVY DISTRICT

BOSTON NAVY YARD

12 August 1926

From: Commandant, First Naval District  
To: Thomas Eadie, C.G.M., Fleet Naval Reserve  
Subject: Transmittal of Navy Cross and Citation for same

1. I take pleasure in forwarding to you Navy Cross awarded for your excellent services in connection with the salvage of submarine S-51.

2. The award of this Cross is a source of satisfaction to all officers and men of the Navy.

PHILIP ANDREWS

*Rear-Admiral, U.S.N.*

## II

### THE OFFICIAL CORRESPONDENCE FOLLOWING THE WORK ON THE S-4, AND THE AWARD OF THE CONGRESSIONAL MEDAL OF HONOR

File No. P15/MM  
140-00-54.

U.S.S. FALCON  
PROVINCETOWN, MASS.  
22 December 1927

From: Commanding Officer  
To: The Secretary of the Navy (Chief of the Bureau of Navigation)  
Via: (1) Captain E. J. King, U.S.N.  
(2) Commander Control Force  
Subject: Heroic work performed by THOMAS EADIE, C.G.M.  
(140-00-54) U.S.N.  
Reference: (a) Navy Regulations, Art. 1707.

1. On December 18, 1927, the Falcon moored over what was presumed to be the U.S.S. S-4, after a grapnel caught on some object on bottom. Eadie was selected to prove the grapnel catch, using grapnel line for his descending line. The catch proved to be the S-4. Eadie made examination of the S-4, sounding with a hammer and reported life in the Torpedo Room. On reaching the limiting time on bottom he was brought to the surface and work proceeded on the information he gave.

2. Carr was diver next selected to hook air hose to the S-4 salvage air lines. Carr succeeded in doing this, time on bottom one (1) hour, fifteen (15) minutes, or fifteen (15) minutes longer than the period I had decided was the safe limit due to temperature as well as depth.

3. By this time darkness had set in, a heavy sea running, wind force 7-8 Bufort scale.

4. Michels was the choice among the remaining divers



to attempt hooking air hose to S-4 Compartments for breathing purposes.

5. Diving conditions were now very bad and would have been discontinued except for the reason that life was involved. Michels having such experience as a deep water diver, it was decided to take this chance to get air on the S-4 Compartments before the wind and sea forced the Falcon from her moorings.

6. Michels went down taking a water light and air hose, tools, etc., for making the connection. The usual telephone communication was carried on and Michels was apparently making progress. When about 3/4 hour on bottom Michels reported that he was badly fouled. The telephone tender could not understand him clearly. Taking the phone I was able to judge from the apparent difficulty he was having to talk over the phone that his condition of foul was serious, and advised him that Eadie would be sent down to clear him. (There was a relief or rescue diver dressed and ready, but all things considered, Eadie was asked to make his 2nd dive within a period of five hours and readily consented.)

7. When Eadie was dressed, telephone trouble developed, delaying his descent so that Michels was on the bottom about one and one-half hours before Eadie reached him. Eadie was given a diver's lamp, cutting pliers, hammer and large wire cutter.

8. Eadie found Michels' life line and hose was foul of broken part of S-4 starboard side where rammed by the Paulding and also on starboard side by parts of Paulding's plating torn off by the collision also tangled with the air hose he had taken down, and so badly tangled that he was lying down and could not rise. Eadie first cleared Michels so he could stand and set about to clear his hose.

9. Eadie cleared one side but could not find where the hose passed in and around some twisted and bent metal,

presumably a part of the Paulding's plating. He next searched for most likely place to attempt to cut away this metal, and asked that a large hack-saw be sent down to him. Hack-saw was sent down on his air line and phone cable. Working with saw and hammer Eadie was able to cut away a piece of metal after alternately sawed and hammered steadily for about forty (40) minutes, upon cutting away the metal, Eadie was then able to trace Michels' air hose and complete clearing him.

Eadie's total time on bottom to clear

Michels

1 h. 45 m.

Michels' total time on bottom

3 h. 20 m.

Temperature of water

34° F.

Depth, 102 ft. Sea, heavy.

10. I have had much experience with deep water diving and consider Eadie's work in this case worthy of the highest praise. His skill and judgment were unsurpassable. His courage and fortitude were heroic. A man not possessing these qualities would have failed. Eadie not only saved Michels' life but exposed himself to personal danger much above the call of duty and devotion to service.

11. I have the honor to recommend THOMAS EADIE, chief gunner's mate, for a medal of honor in accordance with the reference.

HENRY HARTLEY

*First endorsement*

File No. P15/MM

140-00-54

U.S.S. FALCON

PROVINCETOWN, MASS.

25 December, 1927

From: Captain E. J. King, U.S. Navy

To: The Secretary of the Navy (Chief of the Bureau of Navigation)

Via: Commander Control Force

Subject: Heroic work performed by THOMAS EADIE, C.G.M. U.S.N.

1. Forwarded, approval strongly recommended.

2. I was on board FALCON at the time of this event and am fully cognizant of all the circumstances. In addition, I already know EADIE from his excellent work, morale and judgment during the salvage of the S-51.

3. EADIE's conduct on this occasion deserves all the praise and every credit that may be given to a real man who deliberately, knowingly and wilfully took his own life in his hands to respond to the desperate need of a companion diver under wholly adverse diving conditions. What is more, by his cool calculating and unhurried work he succeeded in his tremendous task.

4. There is no doubt in my mind that EADIE's deed in saving MICHELS entirely fulfills the law's requirement of 'extraordinary heroism in the line of his profession.'

E. J. KING

*Second endorsement*

File No. P15/MM  
140-00-54

U.S.S. FALCON  
PROVINCETOWN, MASS.  
23 December 1927

From: Commander Control Force

To: The Secretary of the Navy (Chief of the Bureau of Navigation)

1. Forwarded, strongly recommended.

2. I was on board the FALCON during the entire operation, and I was fully informed as to the progress of events. EADIE knew the danger of the undertaking, but he was not deterred.

3. I have never known so fine an example of cold-blooded, deliberate heroism as that shown by EADIE.

4. He is thoroughly deserving of a medal of honor.

F. H. BRUMBY

Nav328-MB

10 January 1928

MY DEAR MR. PRESIDENT: —

I have the honor to inform you that a Medal of Honor

has been awarded to Thomas Eadie, Chief Gunner's Mate, United States Navy, in accordance with the Act of 3 March, 1901, with the following citation:

'For display of extraordinary heroism in the line of his profession above and beyond the call of duty on 18 December, 1927 during the diving operations in connection with the sinking of the U.S.S. S-4 with all on board as a result of a collision off Provincetown, Massachusetts. On this occasion, when Michels, C.T.M., U.S. Navy, while attempting to connect an air line to the submarine at a depth of 102 feet became seriously fouled, Eadie, under the most adverse diving conditions, deliberately, knowingly and willingly took his own life in his hands by promptly descending to the rescue in response to the desperate need of his companion diver. After two hours of extremely dangerous and heartbreaking work by his cool, calculating and skillful labors he succeeded in his mission and brought Michels safely to the surface.'

Chief Gunner's Mate Eadie continues to be engaged in the salvage work of the U.S.S. S-4, but at such time as he may become available, information will be requested as to your wishes in regard to the presentation of the medal in accordance with the provisions of paragraph four of article 1707 of the Navy Regulations which state that the presentation of a Medal of Honor will be by the President as Commander in Chief or by such representative as the President may designate.

Faithfully yours

CURTIS D. WILBUR

*Secretary of the Navy*

THE PRESIDENT  
WHITE HOUSE



THE SECRETARY OF THE NAVY  
WASHINGTON, D.C.

SIR:

The President of the United States takes pleasure in presenting a MEDAL OF HONOR to

THOMAS EADIE, C.G.M., U.S.N.

for services on the occasion of diving operations in connection with the sinking of the U.S.S. S-4 as set forth in the following

CITATION:

For display of extraordinary heroism in the line of his profession above and beyond the call of duty on 18 December, 1927 during the diving operations in connection with the sinking of the U.S.S. S-4 with all on board as a result of a collision off Provincetown, Massachusetts. On this occasion, when Michels, C.T.M., U.S. Navy, while attempting to connect an air line to the submarine fouled, Eadie, under the most adverse diving conditions, deliberately, knowingly and willingly took his own life in his hands by promptly descending to the rescue in response to the desperate need of his companion diver. After two hours of extremely dangerous and heartbreaking work by his cool, calculating and skillful labors he succeeded in his mission and brought Michels safely to the surface.

For the President

CURTIS D. WILBUR  
*Secretary of the Navy*

### III

## RESOLUTIONS PASSED BY THE CITY GOVERNMENT OF NEWPORT, RHODE ISLAND

### THE CITY OF NEWPORT

#### RESOLUTIONS OF THE BOARD OF ALDERMEN

WHEREAS, it has come to the attention of the Mayor and the members of the Board of Aldermen of the City of Newport that Thomas Eadie, formerly a Chief Petty Officer in the U.S. Navy and Instructor of Diving at the Naval Torpedo Station, was largely instrumental in the successful salvaging of the U.S. Submarine S-51 and, as a result, has won the highest commendations of the officers of the Navy who had charge of such salvaging, and

WHEREAS, said Thomas Eadie is a citizen and resident of the City of Newport and the testimonials of his superiors as to his skill and ability, his intrepid bravery and valor, have reflected credit and honor on the City of his residence, and

WHEREAS, at the time of the wreck of the S-51, in the extraordinary situation which arose, Thomas Eadie, then employed as an ordnance man at the Naval Torpedo Station, volunteered his services as a diver and his work as such evoked the heartiest praise of those in charge of the work, as attested by the extracts from the official reports of the following named officers, viz.:

From Lieutenant Commander E. Ellsberg, U.S.N., dated December 28, 1925:

‘Eadie displayed a remarkable finished technique in his work, combined with a spirit of coöperation and willingness which is rare with a civilian engaged in the div-

ing occupation. His conduct under the most trying conditions was always exemplary. The confidence he instilled into the younger Navy divers by his example is directly responsible in a high measure for the success achieved in the first stage of the salvage operations.'

From Lieutenant Commander Ellsberg, under date of September 8, 1926, to the Officer-in-Charge of Salvage Operations, U.S.S. S-51:

'The Salvage Officer desires to call attention to the bravery of Thomas Eadie, Chief Gunner's Mate (R-1) U.S.N.R. and the exceptional value of his services as a diver in connection with the salvage of the S-51.

'It shortly developed that all other divers looked with good reason on Eadie as the Master Diver, and he was so regarded also by the officers of the work. In a group of brave and skillful divers, Eadie was, without doubt, the best. He was the first man to force his way through the submarine and into the Central Operating Compartment, a dangerous task which several men had tried before, without success. Having shown the way to others, Eadie accompanied them thereafter in the difficult job of sealing up the inside of that compartment — a place where the slightest accident to the diver, or the failure of any part of his equipment, meant a lingering death, for by no possible means could a diver caught there be extricated by others.

'In the work of tunnelling under the boat, a task hardly less dangerous than working inside, Eadie was again the leader, and it was mainly due to his personal skill in this operation that the first tunnel was finally completed.

'Eadie's position in the Naval Reserve and in the civil establishment has resulted in some delay in recommending him for promotion. It is now recommended

that the Navy Department request Congress to enact the following act to promote Eadie:—

“Section 1. That Thomas Eadie, now a Chief Gunner’s Mate with acting appointment, in Class F-1, Fleet Naval Reserve, in recognition of his services in connection with salvaging the S-51, be transferred as a Chief Gunner’s Mate with permanent appointment to Class F-4-C, of the Fleet Naval Reserve, effective July 5, 1926.”

From Admiral C. P. Plunkett, Commandant of the Navy Yard, New York, to the Secretary of the Navy:

‘The recommendation in the letter above and in the first endorsement is strongly approved. From the Commandant’s personal knowledge of Eadie and his work, it is desired to state that the action recommended is fully warranted.

‘It is interesting that the expedition had the services of a diver who is believed to be without peer anywhere in the world for a period of three months at practically the same cost as one ordinary commercial diver for a period of four days.’

From Captain Ernest J. King, Officer-in-Charge, Salvage Operations, S-51, to the Commandant of the Third Naval District:

‘In my 29 years of experience I do not remember having met any one who so thoroughly deserved to have it said of him, “He is a man.”’

NOW THEREFORE, in recognition of the sterling valor of our fellow citizen, Thomas Eadie, this Board tenders to him the sincere and hearty congratulations and good wishes of the people of Newport, and be it

RESOLVED, that a certified copy of this resolution be



forwarded to Mr. Eadie and an additional certified copy be forwarded to the Navy Department to be placed with Mr. Eadie's record as an evidence of the esteem and appreciation in which he is held by the residents of the City of Newport, a municipality long associated with the history of the United States Navy.

(Passed Oct. 28, 1926.)

A true copy.

Attest:

F. H. FULLERTON

*City Clerk*

### THE CITY OF NEWPORT

#### RESOLUTIONS OF THE BOARD OF ALDERMEN

WHEREAS, on the 17th day of December, 1927, the United States Submarine S-4, was sunk off Provincetown, Massachusetts, with its full complement of officers and men; and

WHEREAS, a call for help was sent to the Naval Stations at Newport, Rhode Island, requesting the services of all available divers to assist in the dangerous and difficult task of raising the ill-fated ship; and

WHEREAS, many of the men who heard this appeal were on leave of absence from the United States Navy at the time, and were at their homes in this City; and

WHEREAS, these men rushed to the scene of the disaster and there, while under the most trying and difficult circumstances in the execution of their hazardous and perilous duty, rendered heroic and skillful services in their efforts to save the lives of the officers and men in the torpedo room of the doomed ship, working at all times with diligence and intelligence of the highest order, braving many dangers and unmindful of their own safety; and

WHEREAS, nine of the men, who answered the call to engage in this rescue work, and who finally succeeded in

raising this submarine, for the purpose of securing the bodies of the gallant seamen, who died at their posts of duty as nobly as though they had died in battle, and for the further purpose of a more scientific study of undersea craft to reduce, if possible, a similar catastrophe in the future, are residents of this City; now therefore, be it

RESOLVED, that the City of Newport, in due recognition of the heroism and valor of these citizens, presents its MEDAL OF HONOR, to Thomas Eadie, Fred G. Michels, Edward A. Mattox, Henry Bailey, Joseph H. Stanley, Daniel E. Burd, Thomas J. M. Winters, Walter C. Johnston and William J. Carr; and be it further

RESOLVED, that a certified copy of this Resolution signed by His Honor, Mayor Mortimer A. Sullivan, attested by the City Clerk and sealed with the Corporate Seal of the City of Newport, be presented to each of these men; that a certified copy be forwarded to the Honorable Curtis D. Wilbur, Secretary of the Navy; and that a copy be spread upon the records of the Honorable Board of Aldermen.

In Board of Aldermen April 10, 1928

(Read and Passed.)

MORTIMER A. SULLIVAN  
*Mayor*

A true copy.

Attest:  
F. H. FULLERTON  
*City Clerk*



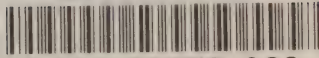








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## THE PEDRO GORINO

*By Captain Harry Dean*

*assisted by Sterling North*

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SPRUNG from a line of African kings, Captain Dean has spent his life in far-off glamorous corners of the earth, often among barbarous peoples. His topsail schooner, Pedro Gorino, went up and down the coasts of Africa, trading in gold and diamonds and ivory and ostrich plumes. Between his voyages, he plunged into the jungle, where no civilized man had ever been before. King Lerothodi and Queen Baring, dusky autocrats of Basutoland, tried to help him build the nucleus of a Black Empire. Far and wide he traveled through the Dark Continent, amassing fortunes in ostrich plumes and mining diamonds unknown to the Colonial authorities.

His dream of empire is ended now, but the wonder and glory with which it invested his life are not ended; they live on triumphant and glowing in this book, magic as the tale of Marco Polo's wanderings.

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# LIVES OF ADVENTURE

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In his topsail schooner, the Pedro Gorino, Captain Dean traded up and down the coast of Africa and dreamed of founding a Black Empire. His extraordinary adventures live again in this absorbing book.

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A picturesque and colorful autobiography by the famous cowboy-actor.

## A FATALIST AT WAR

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